

DOCUMENT RESUME

ED 280 708

SE 047 870

AUTHOR DeBruin, Jerry
TITLE Young Scientists Explore Inner & Outer Space. Book 6--Intermediate Level. A Good Apple Activity Book.
REPORT NO ISBN-0-86653-152-1
PUB DATE 83
NOTE 36p.; Drawings may not reproduce well.
AVAILABLE FROM Good Apple, Inc., P.O. Box 299, Carthage, IL 62321-0299 (\$3.95 GA457; \$47.40 for set of 12 titles GA1105).
PUB TYPE Guides - Classroom Use - Guides (For Teachers) (052)
EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS Developmental Stages; Educational Games; Elementary Education; *Elementary School Science; *Individual Development; *Interdisciplinary Approach; Intermediate Grades; *Learning Activities; *Science Activities; Science Education; Science Instruction; *Space Exploration

ABSTRACT

Designed to develop creativity in young learners, this book contains interdisciplinary activities which focus on the theme of space (inner and outer). Activity pages are provided that can serve as front and back covers of a student booklet and the suggested activities can be duplicated for insertion between the covers resulting in a booklet for each student. A teacher/parent guide is included and supplies background information, activity descriptions, materials needed, and possible answers for the activities. A variety of science-oriented exercises are sequenced chronologically based on developmental characteristics of youngsters from prebirth through age 15. These activities are intended to help the youngsters reflect on where they came from, where they are now, and what may be ahead in the future. (ML)

* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *



YOUNG SCIENTISTS EXPLORE

ED280708

Inner &
Outer

Space

BOOK 6 INTERMEDIATE LEVEL

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION
CENTER (ERIC)
☒ This document has been reproduced as
received from the person or organization
originating it.
☐ Minor changes have been made to improve
reproduction quality.
• Points of view or opinions stated in this docu-
ment do not necessarily represent official
OERI position or policy.

"PERMISSION TO REPRODUCE THIS
MATERIAL IN MICROFICHE ONLY
HAS BEEN GRANTED BY
Jerry DeBruin
TO THE EDUCATIONAL RESOURCES
INFORMATION CENTER (ERIC)."



SE 047 870

By Jerry DeBruin Illustrated by Charlene Czerniak

YOUNG SCIENTISTS EXPLORE INNER & OUTER SPACE

Book 6 -- Intermediate Level
By Jerry DeBruin

TABLE OF CONTENTS

Interdisciplinary Grid

	Science	Mathematics	Social Studies	Language Arts	Reading	Creative Dramatics	Physical Education	Music	Art	Creative Writing	Activity Sheet Number	Developmental Characteristic by Age
Preface: A Note to Teachers and Parents												
My Dictionary of Inner and Outer Space Terms	•			•	•				•		.. ii	
Young Scientists Explore Inner Space	•		•						•		.. 1	All
The Inner Space Before the Miracle of Birth	•	•		•	•				•	•	.. 2	Pre-birth
Birth: A First Glimpse at Space	•	•					•		•		.. 3	1
A Crawl Through Space	•	•							•		.. 5	1
A Walk Through Space	•	•		•	•	•					.. 6	1
Space Talk Codes	•	•	•	•	•		•				.. 7	2
A Ride in Space	•	•	•		•				•		.. 8	3
Youngsters Explore Secret Spaces	•	•							•		.. 9	4
Dress the Astronaut	•		•	•			•		•	•	.. 10	5
Space Stickers	•		•	•					•	•	.. 11	6
Space to Kids Is...	•		•	•	•				•	•	.. 12	7
A Spin Through Space	•			•	•				•		.. 13	7
A Young Scientist Experiments in Space	•	•	•					•			.. 14	8
The Miracle of Space Flight	•	•				•		•	•		.. 15	8
Finding Yourself in Space	•	•	•	•							.. 16	9
Moon Grid	•	•	•	•	•			•			.. 17	10
Vertigo: Being Disorganized in Space	•			•	•					•	.. 18	11
Spaced Out	•		•						•		.. 19	12
A View of Inner Space	•			•	•	•	•				.. 20	13
Sampling Star Space	•	•							•		.. 21	14
Just for Fun: Signs of the Eastern World Zodiac	•		•	•	•						.. 22	15
Just for Fun: Signs of the Western World Zodiac	•	•	•	•	•			•	•		.. 23	15
Young Scientists Explore Outer Space	•		•						•		.. 24	All
Teacher/Parent Guide											.. 25	

Illustrated by Charlene Czerniak cover design by Tom Sjoerdsma Copyright © Good Apple, Inc., 1983

ISBN No. 0-86653-152-1 Printing No. 987654 Good Apple, Inc., Box 299, Carthage, IL 62321-0299

The purchase of this book entitles the buyer to duplicate the student activity pages as needed for classroom use only. Any other use requires written permission from Good Apple, Inc.

PREFACE

A NOTE TO TEACHERS AND PARENTS

Dear Friends,

Thank you for the many kind comments about my previous book, *Creative, Hands-On Science Experiences* (CHOSE) published by Good Apple, Inc., in 1980.

This book, *Young Scientists Explore Inner & Outer Space*, is written as a result of your comments and suggestions, comments that suggested a need for a handy science book or series of books that contain activity sheets which could be duplicated for students' use. *Young Scientists Explore Inner & Outer Space* is an attempt to meet this need.

Young Scientists Explore Inner & Outer Space is the sixth in a series of books that feature science activity sheets which provide youngsters with puzzles, cutouts, hidden pictures, grids, charts, and seek-a-words. Youngsters are encouraged to gain firsthand experience before doing the written activities, for it is through firsthand experience that meaningful learning occurs. Emphasis throughout the book is placed on the development of creativity in the learner. It is hoped that this creativity will be nurtured both during and after the activities are done.

You as teachers and parents who use *Young Scientists Explore Inner & Outer Space* are encouraged to make duplicating masters and transparencies from its pages. The activities are interdisciplinary in nature and are meant to integrate and extend existing science instruction with other academic areas. In addition, the activities are appropriate for intermediate-aged youngsters and are sequenced chronologically, based on developmental characteristics of youngsters from prebirth through age 15. Thus, youngsters are provided with an opportunity for personal reflection on where they came from, where they are now, and what may lie ahead in the future.

To achieve the purpose of writing a book that features activities which involve youngsters in personal reflection, *Young Scientists Explore Inner & Outer Space* attempts to facilitate a basic understanding of Eastern and Western World cultures represented by the Buddha and Astronaut figures respectively. In addition, the book contains a Teacher/Parent Guide that supplies background information including the title, major concept and materials needed for each activity plus a brief description of how to teach the activity and possible answers. When completed and mounted on single-layered cardboard and bound with tape, activity sheets 1 and 24 make up both the front and back covers of the Student Booklet. Completed student activity sheets can then be inserted between these covers with the result being a permanent booklet for each youngster.

It is hoped that these activity sheets will touch many minds, hearts, and hands and that much personal, reflective growth is experienced by all who do the activities. Keep in touch. Let me know how you are doing. It is always good to hear from you. Until then, best wishes in your continued growth as a scientist and complete human being.

Sincerely,

Jeroy McBrinn

MY DICTIONARY OF INNER AND OUTER SPACE TERMS

Unscramble the inner and outer space terms found on the dictionary page below. Place the correct number from the column on the left in the blank in front of the word in the column on the right. On a separate sheet of paper, try to find out what each word means and use it in a sentence. The words "INNER SPACE" and "OUTER SPACE" are done for you. Try to learn at least one inner and outer space term per day. Add more pages to your dictionary as you learn more words.

INNER (in' er) adj. **SPACE** (Spas) n.

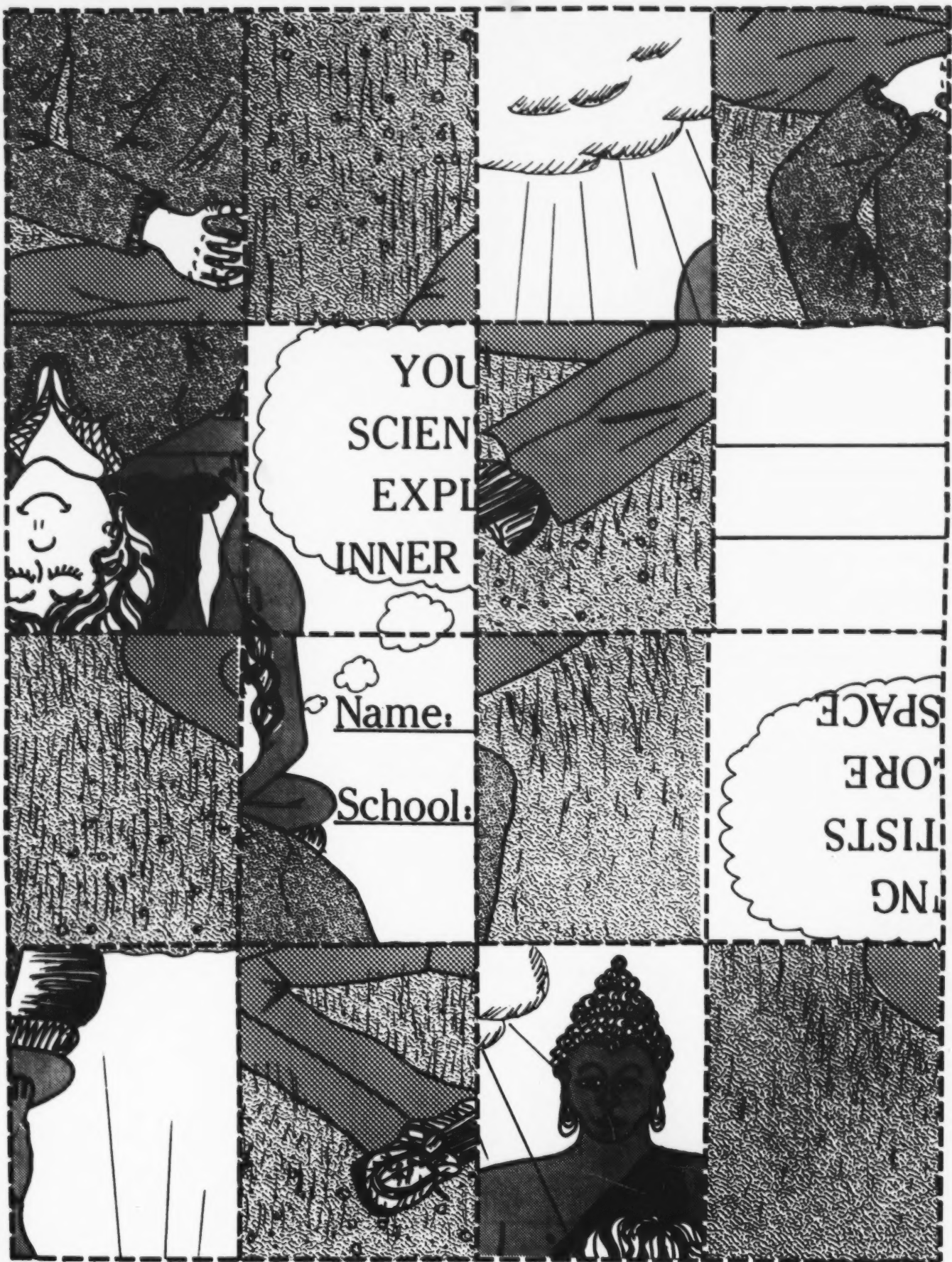
1, situated in or farther within; mental, spiritual, not outward. The inner space "in here" experience is "I."

UNSCRAMBLED INNER SPACE TERMS	SCRAMBLED INNER SPACE TERMS
(1) Meditate	___ Gayo
(2) Zen	___ Asntfay
(3) Mantra	___ Raua
(4) Centering	___ Tuinoltni
(5) Relaxation	___ Ddahub
(6) Mandala	___ Kachra
(7) Yoga	___ Maesrd
(8) Intuition	___ Atcrlve
(9) Dreams	___ Nez
(10) Image	___ Ratlsa
(11) Fantasy	___ Ageim
(12) Brain Waves	___ Dipenltyser
(13) Astral	___ Ternecnig
(14) Aura	___ Anlrb Vawes
(15) Chakra	___ Tidetame
(16) Buddha	___ Latixaeron
(17) Creative	___ Tnaram
(18) Serendipity	___ Daanmla

OUTER (ow' ter) adj. **SPACE** (Spas) n.

1, an unlimited exterior expanse in all directions in which material objects exist. The outer space "out there" experience is "It."

UNSCRAMBLED OUTER SPACE TERMS	SCRAMBLED OUTER SPACE TERMS
(1) Lunar	___ Lipcese
(2) Comet	___ Angb Gib
(3) Lift-off	___ Terdlasa
(4) Capsule	___ Antig Edr
(5) Orbit	___ Mossoc
(6) Astronomy	___ Etlanp
(7) Big Bang	___ Raniu
(8) Constellation	___ Borlt
(9) Galaxy	___ Ytgravi
(10) Gravity	___ Loars
(11) Asteroid	___ Selvernu
(12) Red Giant	___ Tellasite
(13) Satellite	___ Oftffil
(14) Solar	___ Meoct
(15) Cosmos	___ Sulceap
(16) Universe	___ Xylaag
(17) Planet	___ Liaonsteconlt
(18) Eclipse	___ Moyontras



YOU
SCIEN
EXPL
INNER

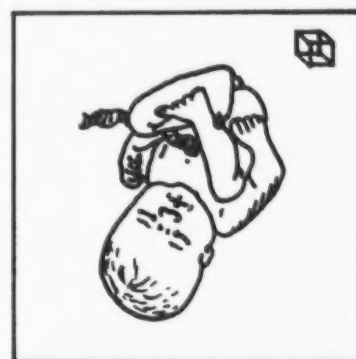
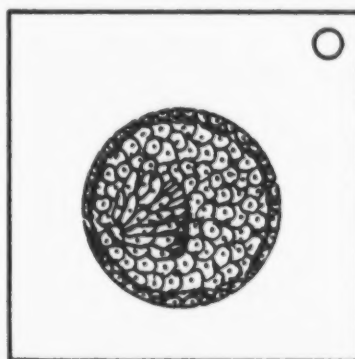
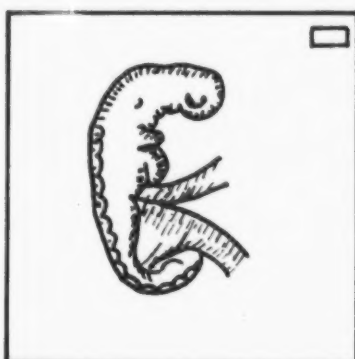
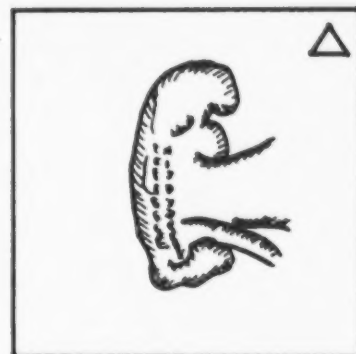
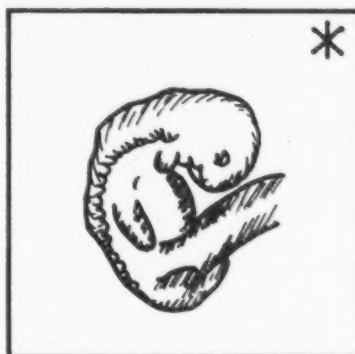
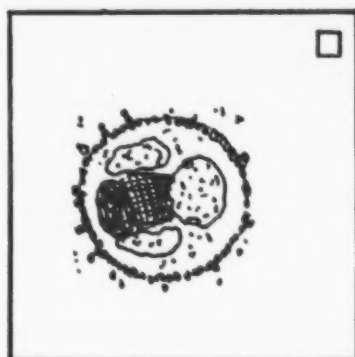
Name:

School:

SPACE
ORE
TISTS
NG

THE INNER SPACE BEFORE THE MIRACLE OF BIRTH

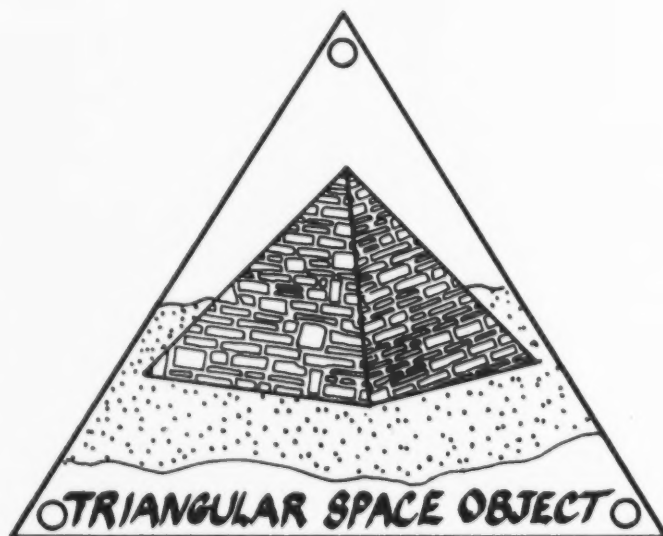
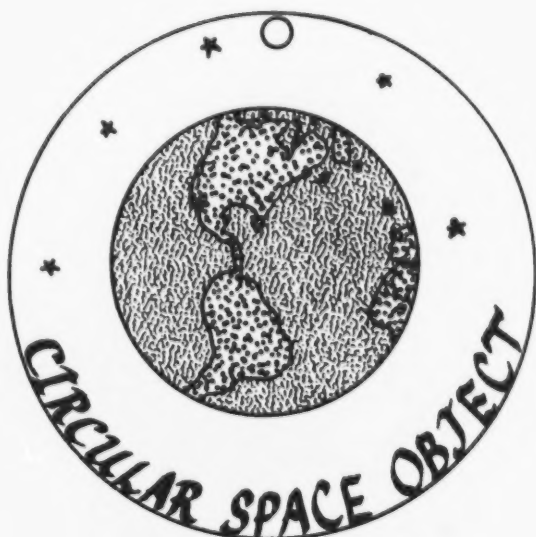
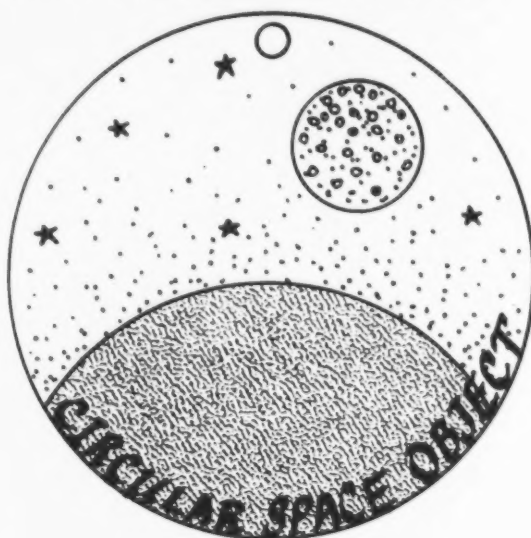
Before youngsters are born, their space is limited to a small sac filled with fluid inside their mothers. They float about in their watery environments and grow through various stages. Below are 10 cards that show these stages. Cut apart the cards and glue to similar-sized pieces of cardboard. Arrange cards in correct order to show the stages of growth. From the list below write the number of day(s) or week(s) of development on each card that corresponds to that stage. Then, write a news feature article about how it must have felt being inside your mother before you were born. Be sure to interview your mother to find out how she felt. Enter both stories in your science notebook.



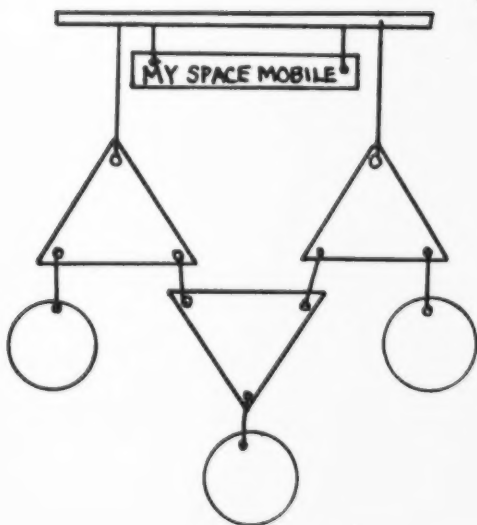
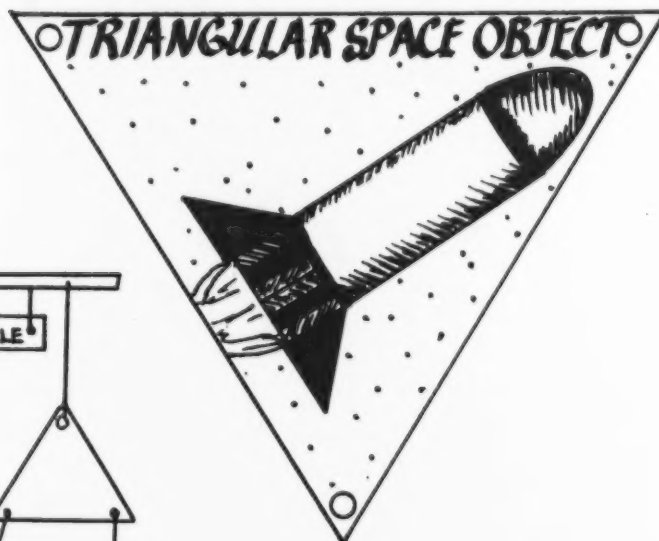
List to choose from: Day 13, Day 1, Day 29, Week 9, Week 26, Day 7, Week 38, Day 23, Week 14, Week 5.

Birth: A First Glimpse at Space

In the first year after birth, a youngster spends a lot of time in his/his baby bed. Parents often hang a mobile on or near the bed for the youngster to observe. To make a mobile, cut out the shapes below. Glue shapes to cardboard or tagboard. Laminate. Punch holes for string. Print names of appropriately shaped objects that occupy space in the environment on the back of each mobile piece. A rock may be round so the word "rock" is written on the circle shape. Thread with string and attach pieces to tagboard as shown. Balance. Hang from wall, ceiling, or desk for all to observe. Then, do one activity that requires you to balance your body on some object in space. Further your study and discover what special space in your ear keeps you from losing your balance.



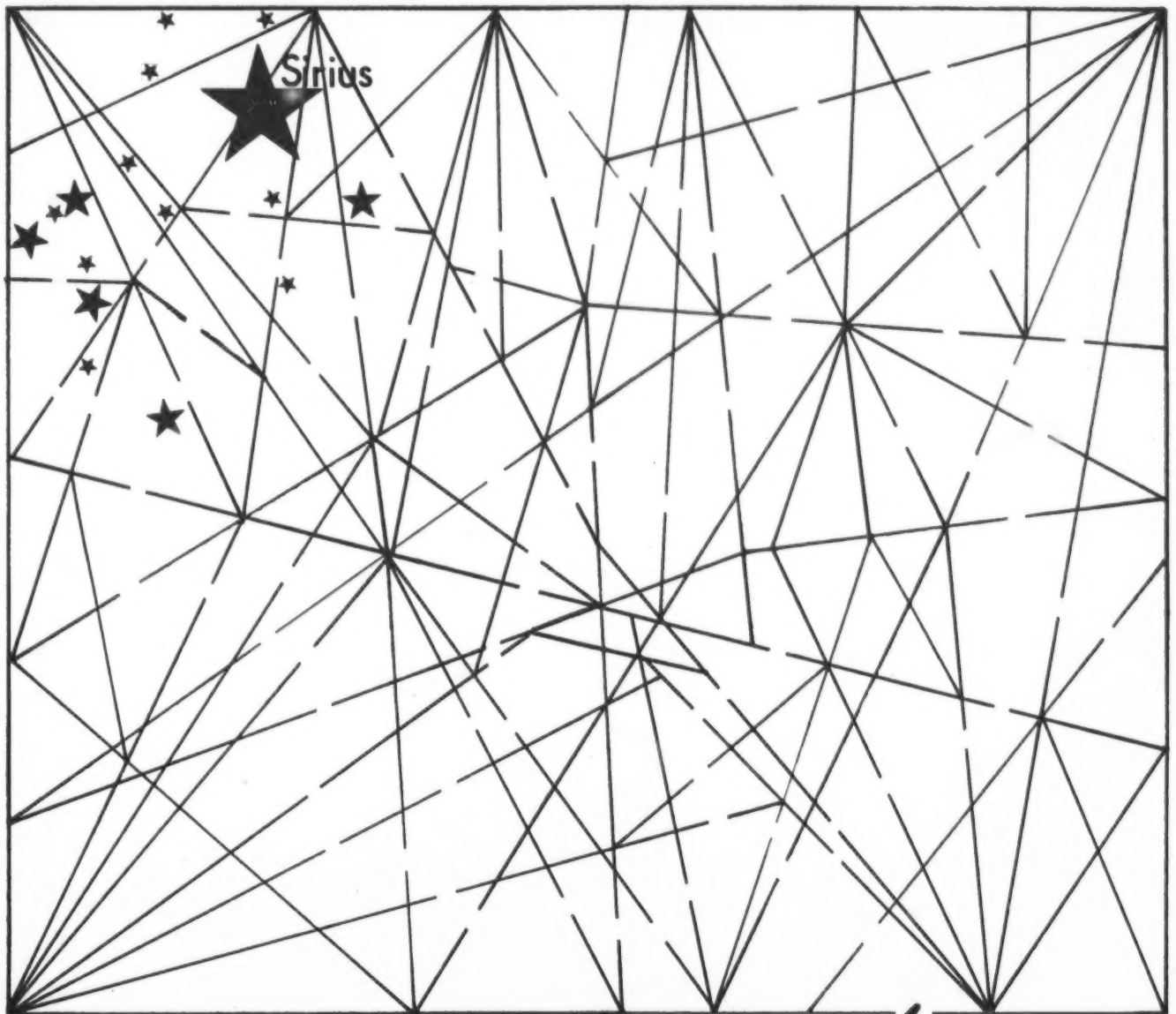
MY SPACE MOBILE



A CRAWL THROUGH SPACE

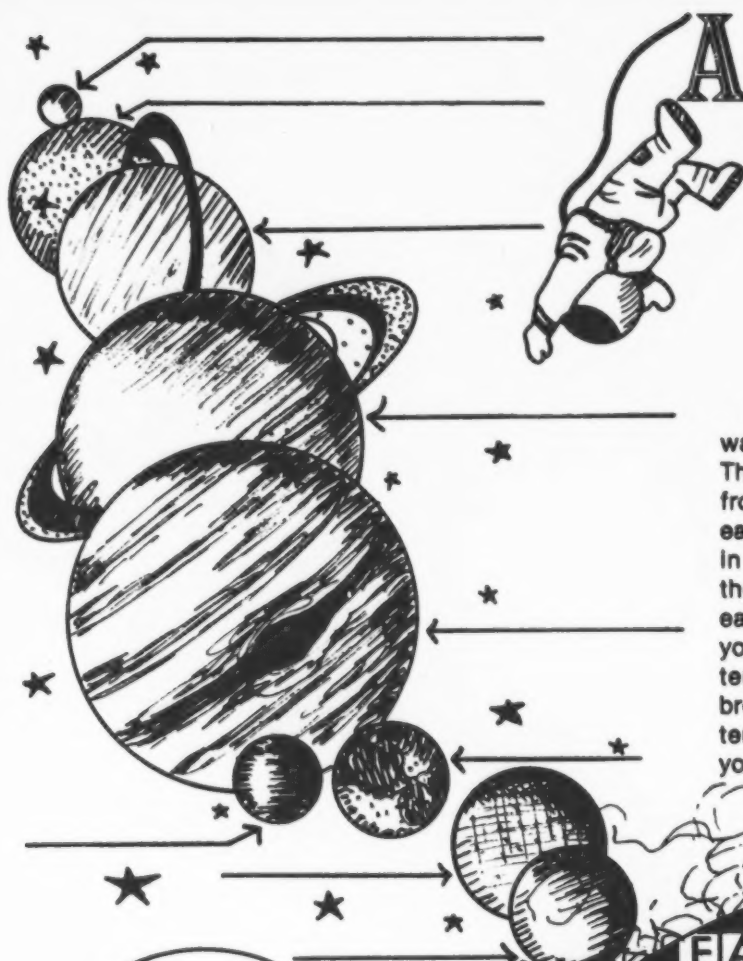


Before age one, youngsters often crawl through space around their homes. Astronauts, too, often crawl about in their spaceships. Help an astronaut crawl through the space maze below to reach a very bright star named SIRIUS found in the constellation CANIS MAJOR (the Dog). Find and shade in the perfect star. Then, in a book on stars, find CANIS MAJOR. In the maze below, connect the stars in the constellation CANIS MAJOR to make the shape of a dog. Learn the shapes of other constellations in the sky and sketch these in your science notebook.



Start Here

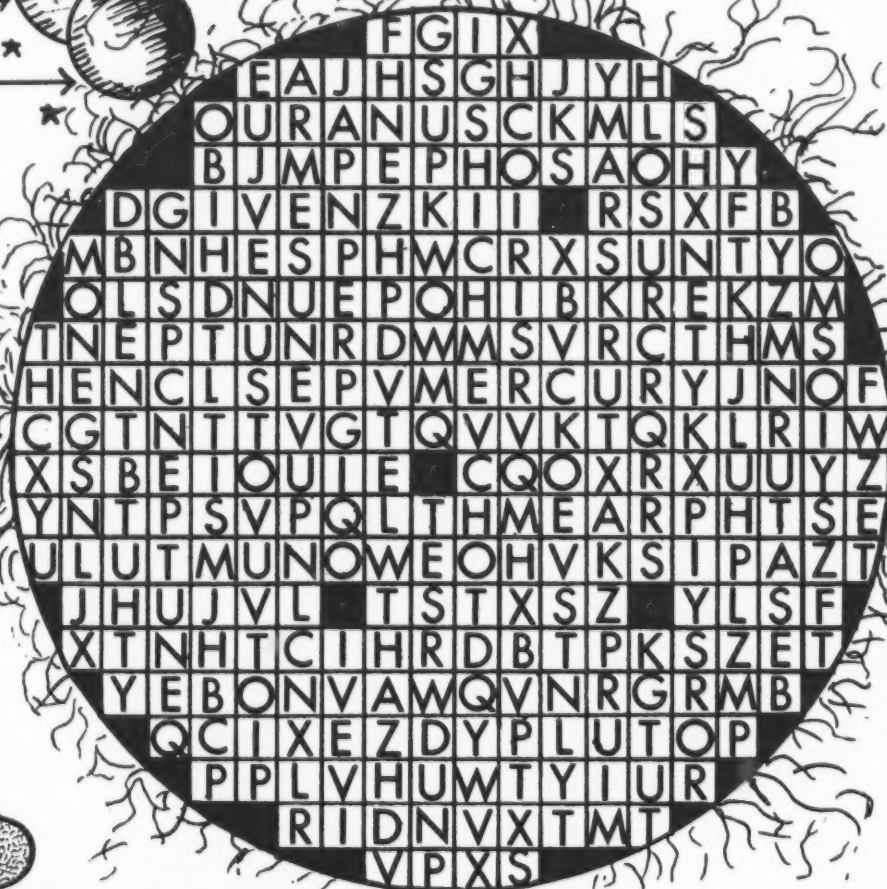




A WALK THROUGH SPACE

At about age one, youngsters begin to walk in space. Astronauts, too, walk in space. The picture below shows the planets in order from the sun. Help the astronaut identify each planet by placing the name of the planet in the correct blank. Then, in the puzzle on the sun below, find and circle the name of each planet. Read the saying that will help you remember the order of the planets. To extend your activity further, develop a news broadcast that features the discovery of a tenth planet in the solar system and present your tape-recorded broadcast to the class.

Mary's Velvet Eyes
Make John Stay Up
Nights Pondering



SPACE★TALK★CODES

Youngsters at about age two begin to talk a lot but sometimes their speech becomes *garbled*. Use the code below to clear up an important but *garbled* message from the first astronaut to step on the moon. Name the astronaut who sent this message, the date he stepped on the moon and what he said. Then, name some satellites that send messages through space.

The diagram illustrates a sequence of radio transmission signals. It consists of two rows of boxes, each preceded by a series of dots representing a Morse code signal. The top row contains: a box with '0' (preceded by 1 dot), a box with 'Call' (preceded by 3 dots), a box with 'Invitation to Transmit' (preceded by 3 dots), a box with 'Period' (preceded by 3 dots), a box with 'Interrogation' (preceded by 3 dots), and a box with 'Break' (preceded by 3 dots). The bottom row contains: a box with 'Wait' (preceded by 4 dots), a box with 'End of Message' (preceded by 3 dots), a box with 'End of Transmission' (preceded by 4 dots), a box with 'Received' (preceded by 3 dots), a box with 'Go Ahead' (preceded by 3 dots), and a box with 'Comma' (preceded by 4 dots).

MESSAGE:







$\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ $\frac{1}{2} \times \frac{1}{4} = \frac{1}{8}$ $\frac{1}{4} \times \frac{1}{4} = \frac{1}{16}$ $\frac{1}{2} \times \frac{1}{8} = \frac{1}{16}$ $\frac{1}{4} \times \frac{1}{8} = \frac{1}{32}$ $\frac{1}{8} \times \frac{1}{8} = \frac{1}{64}$









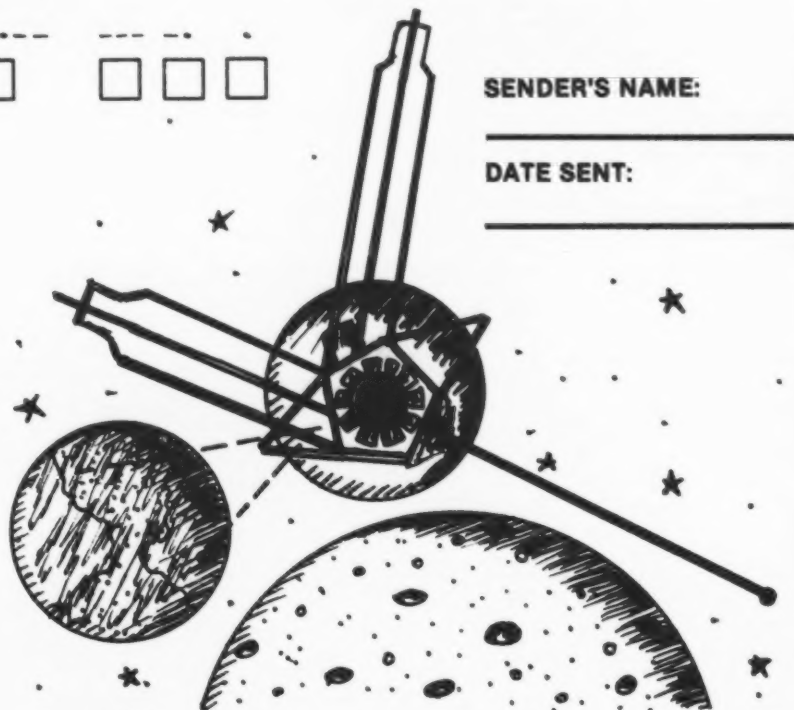


● — ● ●	●	● —	● — ● ●
☐	☐	☐	☐

□ □ □ □ □ □ □ ★

☐**SENDER'S NAME:**

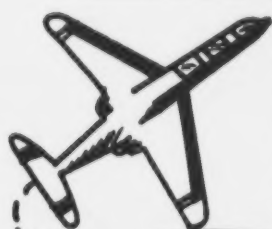
DATE SENT:



A RIDE IN SPACE

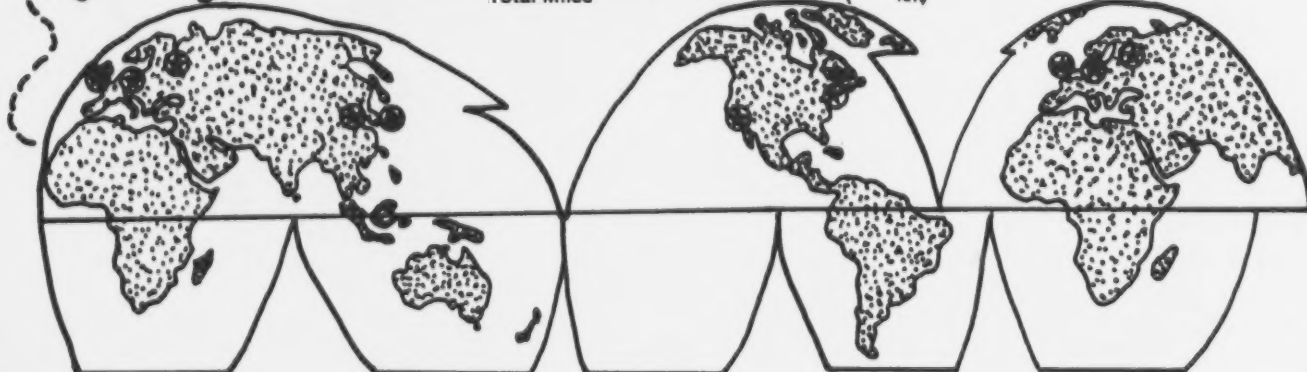
Youngsters at age three increase the size of their space by taking real or imaginary trips in cars, trucks, and airplanes. Using the chart below, determine the distance in miles (kilometers) traveled through space between selected world cities. Write your answers in the chart below. Add up total miles (kilometers) traveled. If done correctly, you will have traveled over 30,000 miles (36,000 km) thus making you eligible for membership in the 30,000 Mile (36,000 km) Space Club. Cut out and color your ribbon below. Place in your science notebook for all to see.

	Berlin, Germany	London, England	Los Angeles, USA	Moscow, USSR	New York, USA	Peking, China	Quebec, Canada	Tokyo, Japan
Berlin, Germany		574 (924)	5782 (9305)	996 (1603)	3961 (6374)	4567 (7350)	3583 (5766)	5538 (8912)
London, England	574 (924)		5439 (8753)	1549 (2493)	3459 (5567)	5054 (8133)	3101 (4990)	5938 (9556)
Los Angeles, USA	5782 (9305)	5439 (8753)		6068 (9765)	2451 (3944)	6250 (10,058)	2579 (4150)	5470 (8803)
Moscow, USSR	996 (1603)	1549 (2493)	6068 (9765)		4662 (7503)	3597 (5789)	4242 (6827)	4650 (7483)
New York, USA	3961 (6374)	3459 (5567)	2451 (3944)	4662 (7503)		6823 (10,980)	439 (706)	6735 (10,839)
Peking, China	4567 (7350)	5054 (8133)	6250 (10,058)	3597 (5789)	6823 (10,980)		6423 (10,337)	1307 (2103)
Quebec, Canada	3583 (5766)	3101 (4990)	2579 (4150)	4242 (6827)	439 (706)	6423 (10,337)		6417 (10,327)
Tokyo, Japan	5538 (8912)	5938 (9556)	5470 (8803)	4650 (7483)	6735 (10,839)	1307 (2103)	6417 (10,327)	



FROM	TO	Number of Miles (Kilometers)
New York, USA	Los Angeles, USA	
New York, USA	Berlin, Germany	
Los Angeles, USA	Quebec, Canada	
New York, USA	London, England	
Los Angeles, USA	Peking, China	
New York, USA	Tokyo, Japan	
Los Angeles, USA	Moscow, USSR	

Total Miles (km)

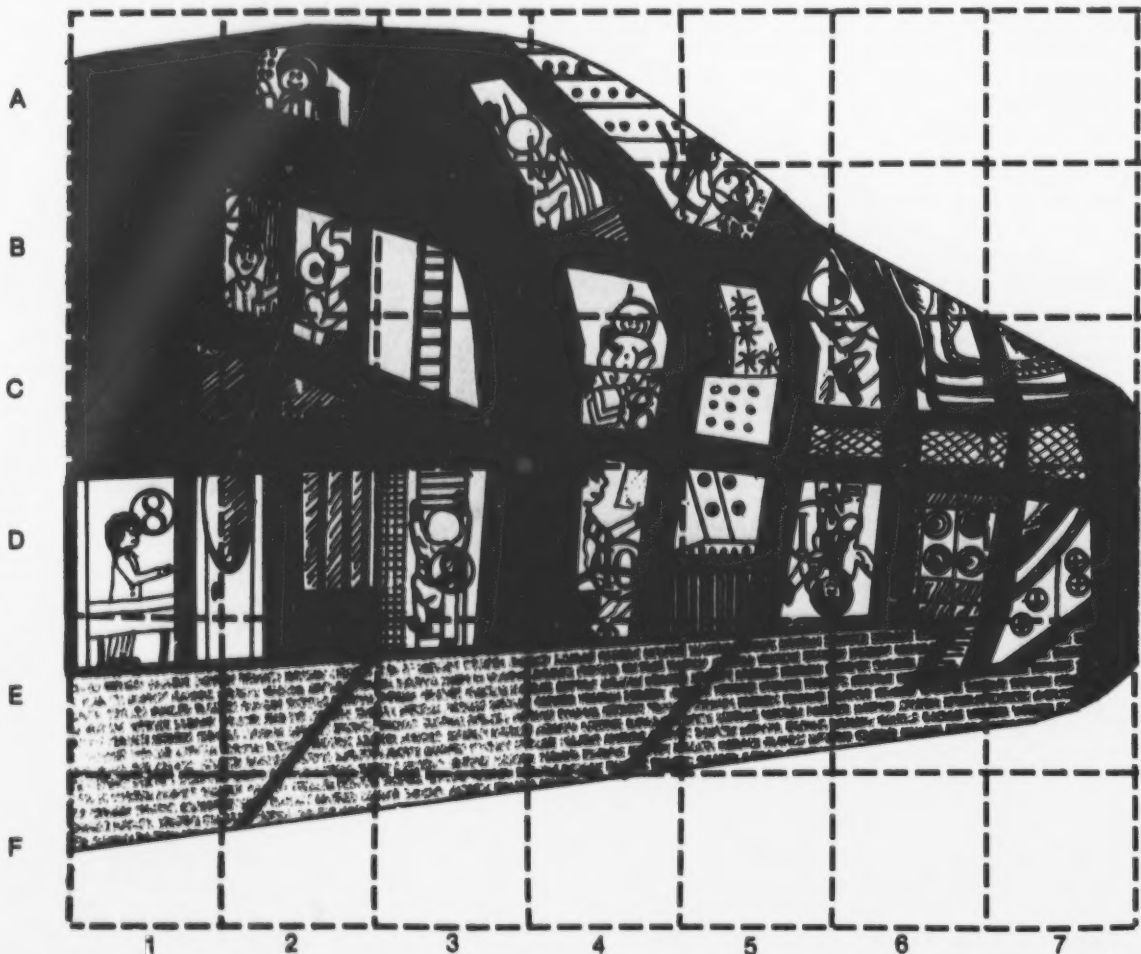


YOUNGSTERS EXPLORE SECRET SPACES

At age four, youngsters continue to explore secret spaces in various rooms around the home. Below is a future space station, a home for astronauts that includes many secret hidden spaces to explore. Find the total number of square inches (cm²) in both the grid area and space vehicle below. Then, identify the grid space in which each astronaut is found. Place your answers in the chart below. Describe possible duties for each astronaut. Design one science experiment that could be done on a future Space Shuttle mission to outer space. Give your idea to your teacher. Be sure to include a sketch and description of your idea in your science notebook.

Total Grid Area: _____ square inches (_____ cm²)

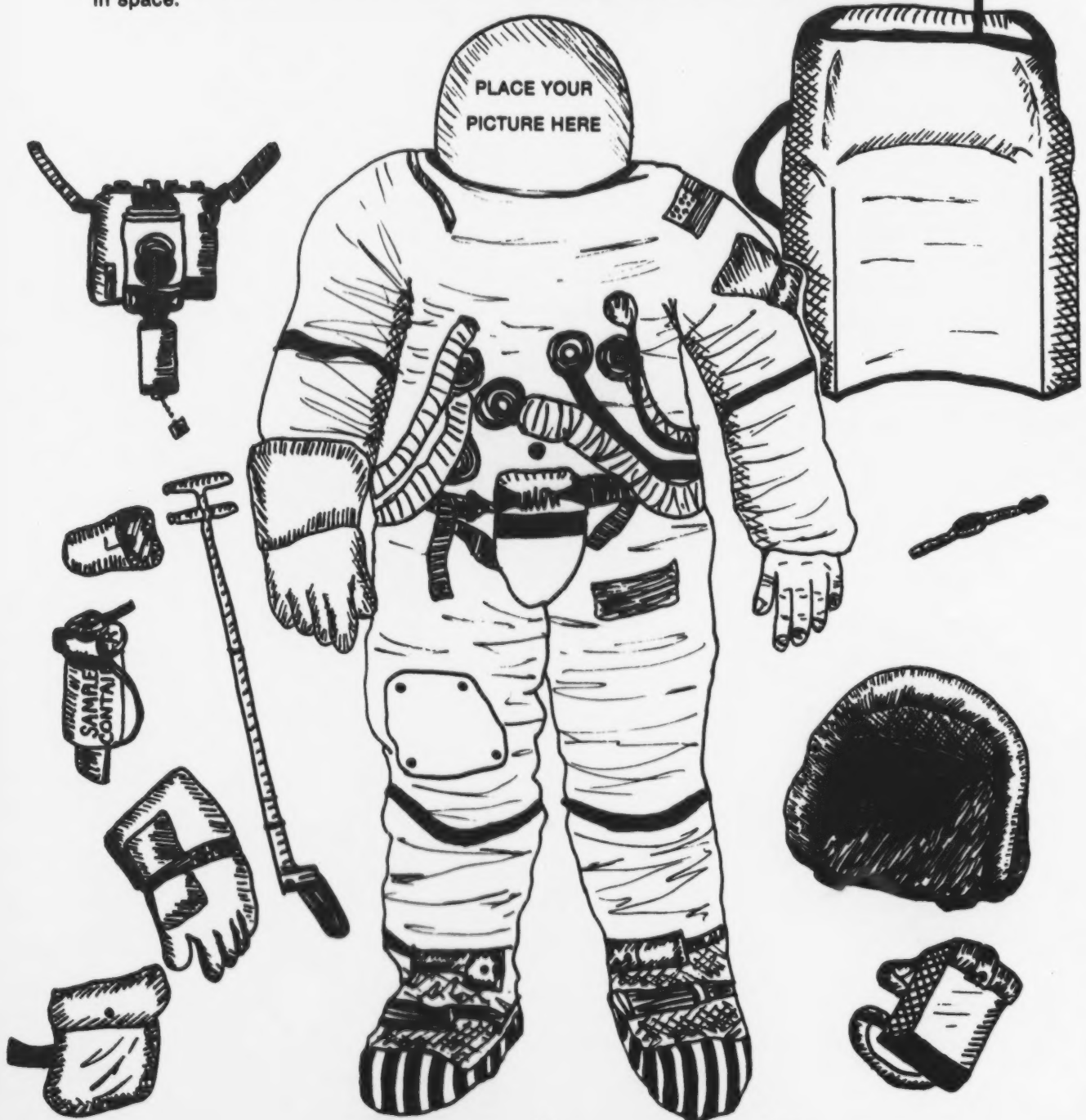
Total Area of Space Station: _____ square inches (_____ cm²)



Astronaut Number	Grid Space	Duty/Role	Astronaut Number	Grid Space	Duty/Role
1			7		
2			8		
3			9		
4			10		
5			11		
6					

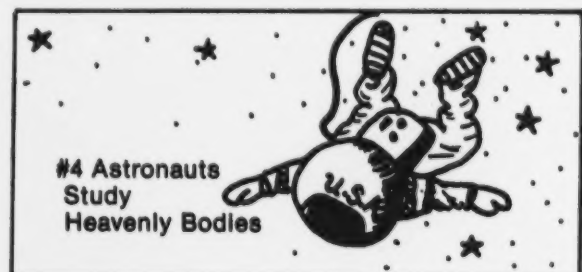
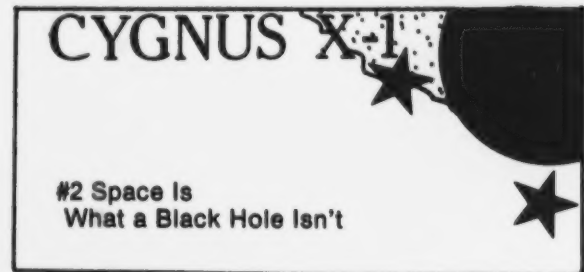
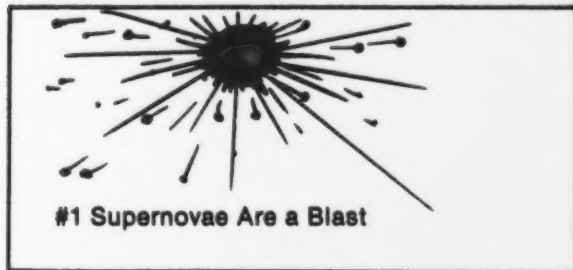
DRESS THE ASTRONAUT

At about age five, youngsters like to dress up and pretend they are certain characters. They may become doctors, nurses or astronauts. Below is a picture of an astronaut with various pieces of clothing and equipment. Cut out each piece. Dress the astronaut by gluing each piece in its correct space. Then, glue a picture of your face on the blank face of the astronaut. Cut out and name your astronaut. On the back of the astronaut, design an advertisement that tells the qualifications needed to become an astronaut. Then, tell your friends why you may want to become an astronaut some day. Extend your study further by studying the activities of Ham, America's first astronaut. Ham, a chimpanzee, made a suborbital flight in January, 1961, before America's first human astronaut, Alan Shepard, made his first flight in space.



SPACE STICKERS

Youngsters at age six enjoy making collections of favorite stickers. They often see bumper stickers on cars and receive stickers on papers at school. Below are four sample space sticker ideas that when taped, pinned or glued to a favorite space can be used as a start towards a space sticker collection. Cut out each idea. Tape, pin or glue to favorite space. In the box below, design a personal space sticker. Then, display your sticker at home or in your classroom for all to see.



SPACE TO KIDS IS...

At age seven, youngsters begin to read many books about space. Below are seven space-related statements made by youngsters who read space books. Read each statement. Circle the word "agree" if you agree with the statement or "disagree" if you disagree with the statement. In the space bubble below, write a story about what "space" means to you. Then, make a space scrapbook that includes information, ideas, and photographs of space activities found in newspapers and magazines. Conclude your study by holding a debate on whether you feel the U.S. should explore outer space.

Space is an empty piece of nothing.
Age 10

Agree
Disagree



Space is nothingness that goes on forever.
Age 11

★ Agree
Disagree



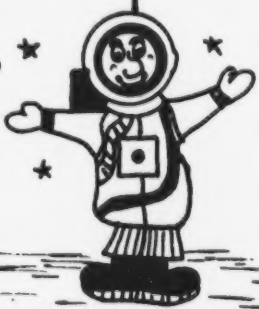
Oh, space is what we live, sleep, eat and die in.
Age 12

Agree
Disagree



In space, minute particles of matter float endlessly.
Age 13

Agree
Disagree



Space is everything. Space is eternity.
Age 14

Agree
Disagree



Space is a vast emptiness, though usually filled with the normal aspects of life.
Age 15

★ Agree
★ Disagree



And, if space ended, what is beyond the end?
Age 15

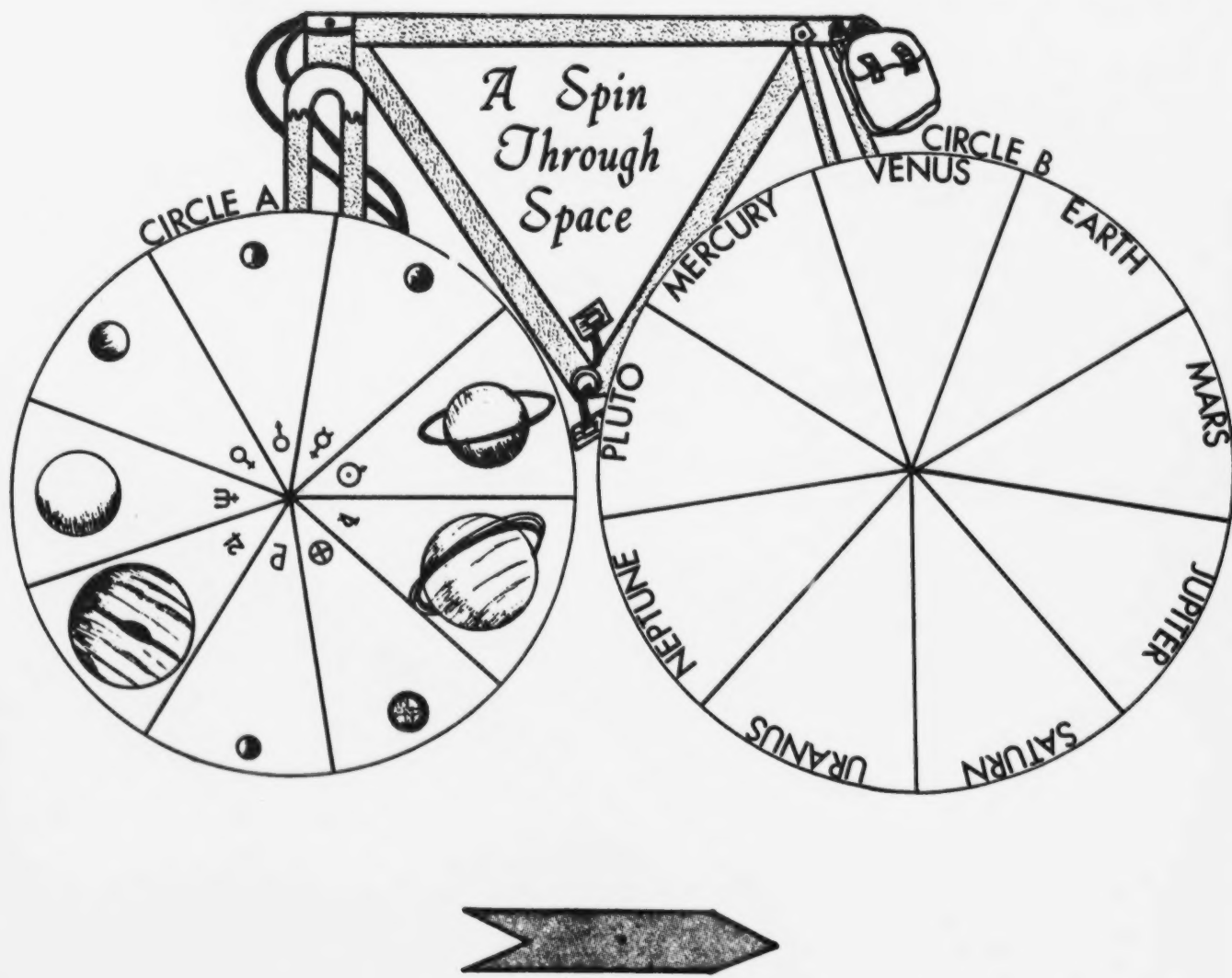
★ Agree
★ Disagree





MY SPACE BUBBLE..

At about age seven, youngsters begin to take many spins through space on their bicycles. Take a spin on your bike through the solar system below. Cut out circles A, B and the pointer. Mount on single-layered cardboard. Laminate. Punch holes in centers of circles A and B and pointer. Place pointer on top of circle A and circle A on B. Insert cardboard disc between circles to act as washer. Attach at centers with paper fastener. Spin pointer. Note sign of planet on circle A. Then, rotate circle B until the name of the planet on the outer rim of circle B matches the sign of the planet on circle A. Then, on a separate piece of paper list one special feature for each planet in our solar system. Make other planet or star constellation wheels. Enjoy your spin through space.

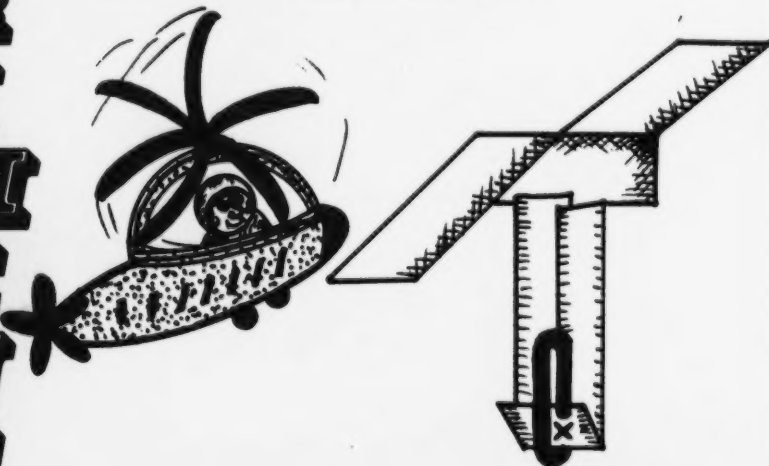


A YOUNG SCIENTIST

EXPERIMENTS IN SPACE

At about age eight youngsters begin to design spacecrafts used to explore space. Carefully read directions below. Cut out and launch helicopter. Then, look up the name of the person who invented the helicopter and make a tape-recorded message to the class on his accomplishments.

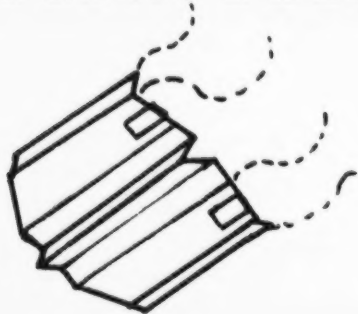
DIRECTIONS: Cut slots D, E and F. Fold flaps A and C over flap B and glue. Bend Blade A away from Blade B. Hold overhead by grasping point X. Add paper clip. Let go. Find out if your helicopter turns clockwise or counterclockwise as it falls. Time how long it takes the helicopter to land. What happens when you fold Blades A and B in opposite directions or make shorter or fatter blades? On a sheet of paper, record your results in a chart that looks like the one below.



A	B	C
CUT D CUT E		
Helicopter		
CUT F		
BLADE A		BLADE B

TRIAL NUMBER	DROP HEIGHT	IN.	CM.	TIME IN SECONDS	SPIN: CLOCKWISE / COUNTERCLOCKWISE	OTHER

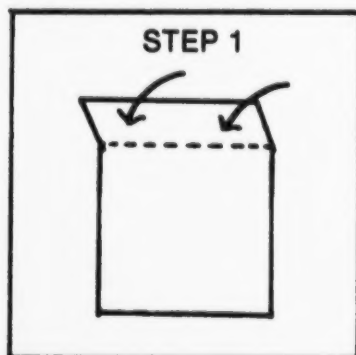
The Miracle of Space Flight



At about age eight, youngsters design and propel

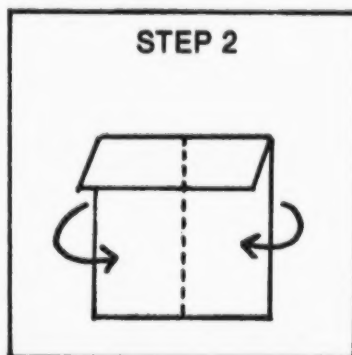
objects into space. Using a sheet of paper, follow the nine steps below to make an airplane that will fly through space. Name the aircraft and its parts. Do test flights by increasing angle of wings and elevators. Take an Imaginary ride into space aboard the aircraft. In a flight log book, record what is seen on the trip. Report results to Mission Control.

Fold top of paper down 2" (5 cm)



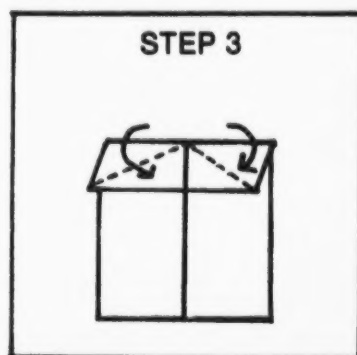
Triangles in place

Fold in half lengthwise and re-open flat

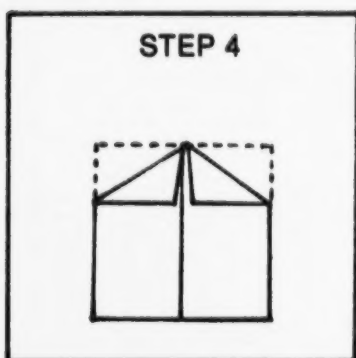


Fold 1" (2.5 cm) lengths of wings toward center line

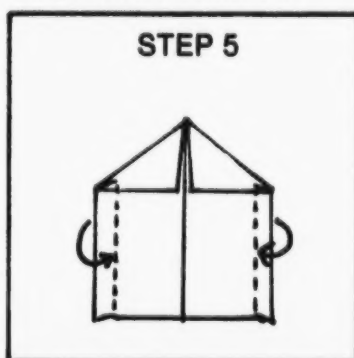
Fold corners toward center to make triangles as shown in STEP 4



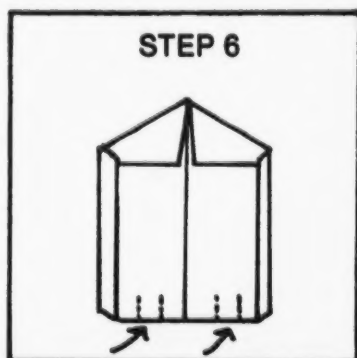
Cut two 1" (2.5 cm) by 1" (2.5 cm) elevators in tail



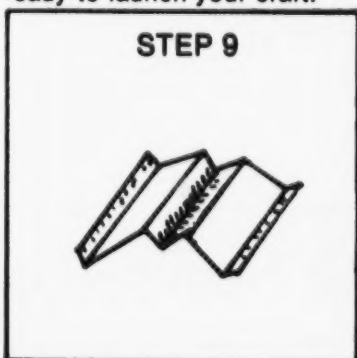
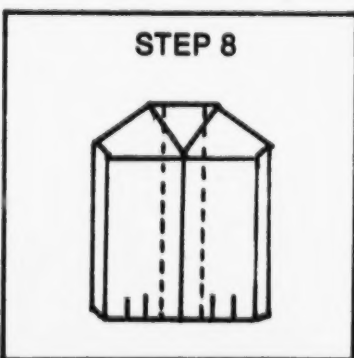
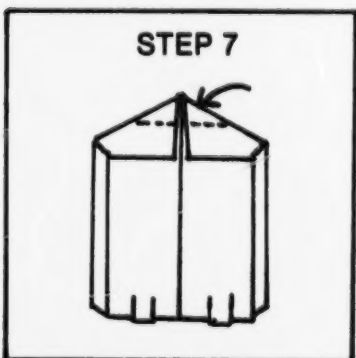
Fold nose down 1½ inches (3.75 cm) toward tail



Fold center sections 1" (2.5 cm) from center line

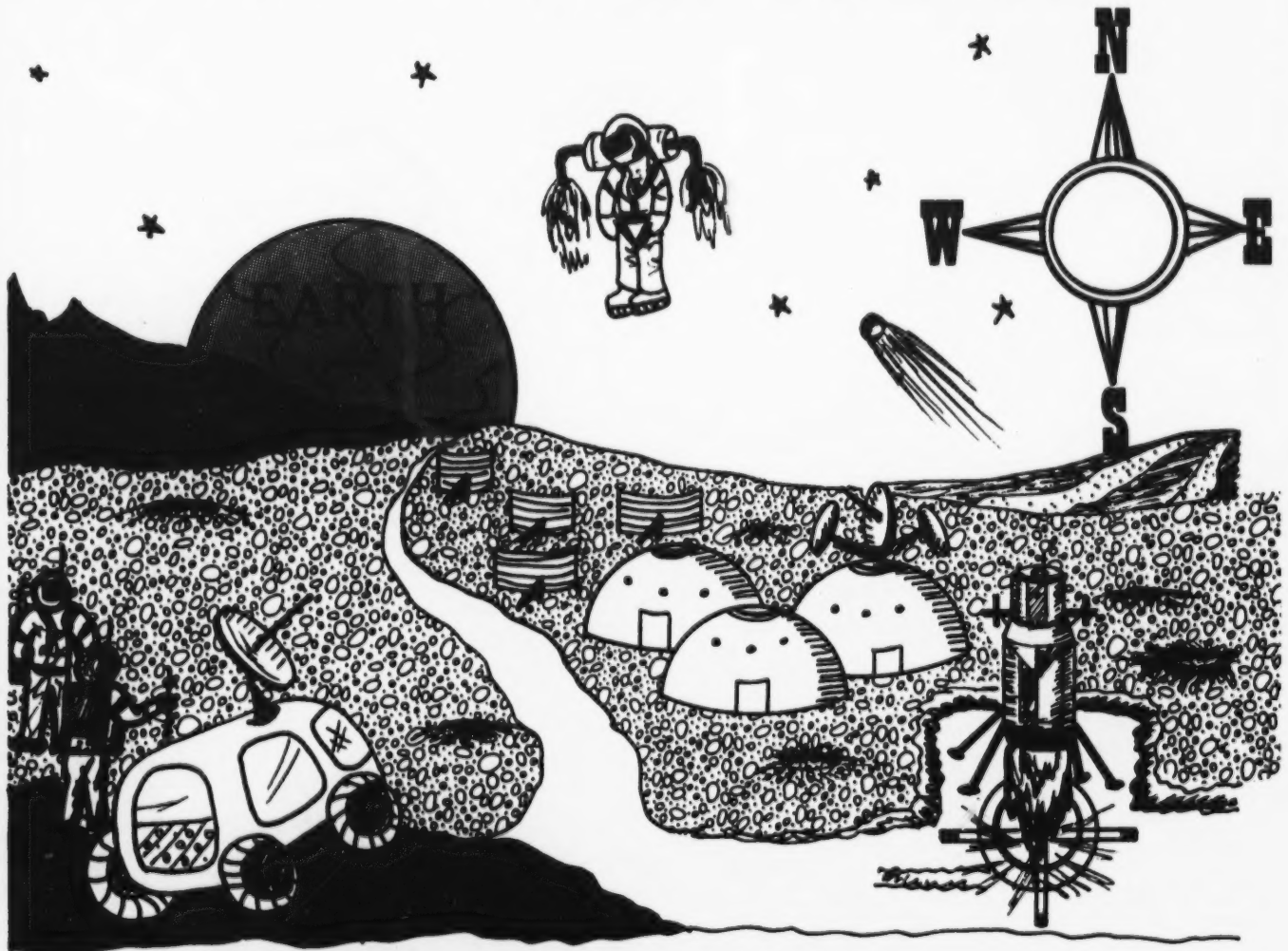


Folds in Step 8 make "W" as shown in Step 9. You are now ready to launch your craft.



FINDING YOURSELF IN SPACE

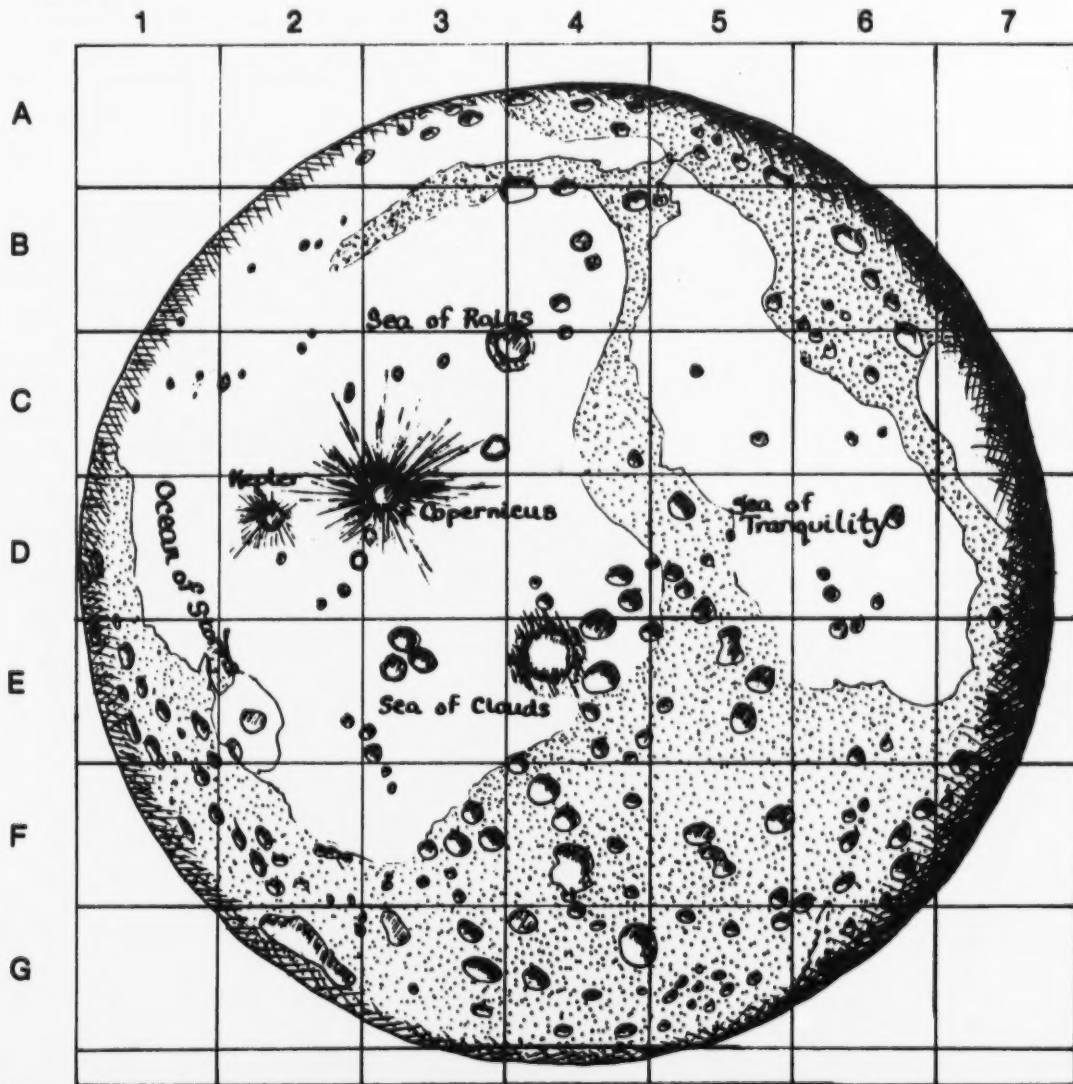
At about age nine, youngsters begin to locate themselves in space relative to other people or objects. Pretend that you are standing on the moon below and are looking back at the earth. Locate the three astronauts in the space scene below. Help the astronauts find their locations by circling the correct answers to the questions. Find out if your answers would be the same if the astronauts were on *earth* looking at the moon. Then, draw a cartoon or write a riddle that would help the astronauts find their way on the newly discovered planet.



1. The two astronauts are to the (right, left) of the Earth.
2. The two astronauts are (above, below) the moon's horizon.
3. The flying astronaut is in the (front, back) of the launch vehicle.
4. The flying astronaut is to the (west, east) of the comet.
5. The two astronauts report that planet Earth is to the (north, south).
6. The two astronauts report that the stars are (moving, not moving).
7. The flying astronaut reports that the stars are (moving, not moving).
8. If the pair of astronauts boarded the moon rover and started driving to the launch pad, they would report that the earth was (moving, not moving).

MOON GRID

Youngsters at age ten begin to read about, look at and locate certain features on the moon. Below is a map of the moon with grid lines. Using the grid numbers and letters below, place "X's" in the squares on the map where the following moon space activities occurred. Write the name of the site next to the "X." Then, find out what Apollo mission featured the first man to step on the moon and whether that person stepped in a mare or crater. The first one is done for you.



Event	Grid Space	Location	Event	Grid Space	Location
Apollo 11	D5	Sea of Tranquility	Apollo 16		
Apollo 12			Apollo 17		
Apollo 14			Luna 16		
Apollo 15			Luna 17		
			Luna 20		

VERTIGO: BEING DISORGANIZED IN SPACE

Youngsters at age eleven are very outgoing and enjoy telling stories and playing jokes on their friends. However, youngsters at this age tend to be disorganized in space with materials often found in a tizzy at their desks in school or their bedrooms at home. Astronauts, too, sometimes become disorganized in space. Help the astronaut, in the youngster's thoughts below, find his clothes and tools hidden around the messy desk. Circle each item. Then, acting as a medical doctor, find out what the word *vertigo* means and write a prescription for a pilot or astronaut who suffers from vertigo. Objects to find: glove, camera, scoop, sample tube, watch, hammer, collection packet, shuttle, core tube and rammer.



SPACED OUT

Youngsters at age twelve like to observe a small space event and often expand it into a much larger space happening. Below is a picture of the U.S. flag left on the moon by the astronauts. Color the areas marked "o" orange, "g" green and "b" black. Stare at the flag for 45 seconds. Shift your eyes to a white wall. Continue to stare. Draw and color a picture of what you see. Then, try other colors that will change color for different objects and scenes in the picture. Repeat. In the black space below, color or paint a picture of what you see. Place in your science notebook for future use in space activities.



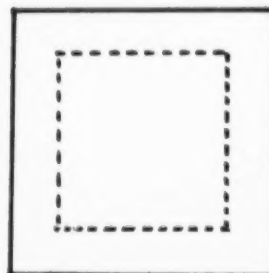
A VIEW OF INNER SPACE

Some people feel that youngsters at age thirteen tend to have little humor, keep secrets to themselves and are withdrawn into their own inner space. Help your friends discover both inner and outer space by reading them the sun story found in the sun below. It reads as follows:

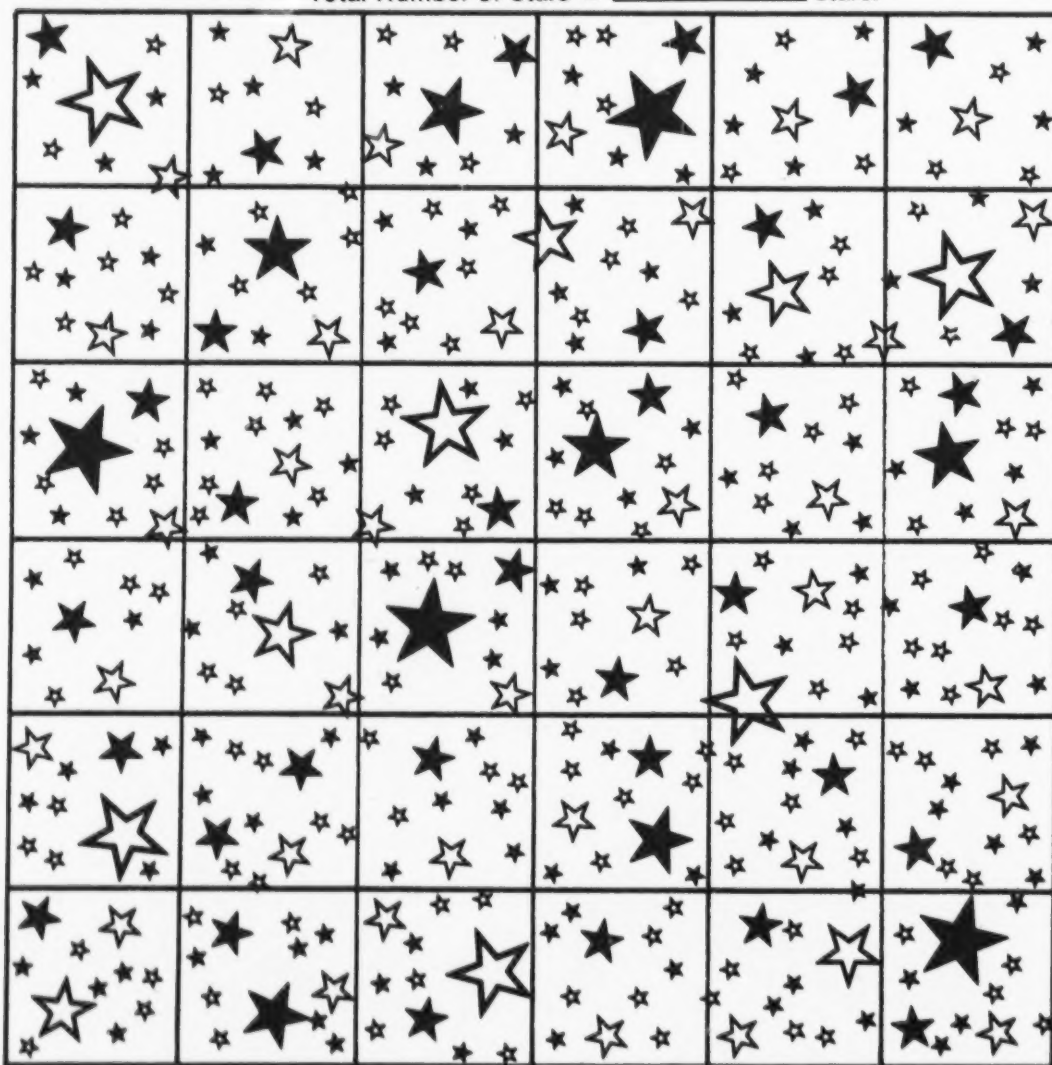
"Close your eyes and relax. You are taking an imaginary trip into the center of yourself. On your way, you will collect all the energy in your body and place it in a pleasant feeling 'sun' located deep inside your body. Suddenly on your journey to the 'sun' you feel that you have never seen anything before because you were born blind. You haven't seen the color of grass, rainbows or even people. In addition to being blind, you feel that you have never touched anything or anyone because of the sun being wrapped around you. Going farther into the center of the sun, you lose your sense of hearing. All sounds are quickly absorbed by the surrounding sun. Being very still in your new inner space, you imagine that you can't smell anything either as the smells are gathered up by the sun. The sun suddenly shrinks in size and gets more powerful as it gathers in your favorite tastes. Then, nothing but stillness. You lie quietly at the center of the sun in your center space. You have no senses but you know that you are there. You are deep in inner space. You are alone in the quiet space of nothingness. You do not move. You see nothing, taste nothing, smell nothing and hear nothing. You feel that you are nothing, too, but well know that you are really something. You are you. You find yourself in the vast space of nothingness. Gradually your senses begin to return to you as you feel the gentle touch of a loving hand on your warm skin. You begin to hear faint sounds, smell familiar smells and are reacquainted with refreshing tastes. You emerge from the center of the sun on your journey toward outer space and see a faint ray of sunshine that greets you with the words 'Open your eyes. Move your body.' In your daily diary, write the rest of the story. Act out what happened after you felt the gentle touch of the hand, loving warmth on your skin and were greeted by the ray of sunshine on your trip into space beyond your body."

SAMPLING STAR SPACE★

At about ages fourteen or fifteen, youngsters are astonished at the number of stars seen in the sky. Below is a space filled with hundreds of stars. It is impossible for a space scientist to count every star, but you can help by taking a *sample* of stars. Cut out the square to the right on the solid lines. Then, cut out the inside square on the dotted line to make a frame with a one square inch opening. Drop this frame anywhere in the sky. Count the number of stars inside the frame. Repeat two more times. Add up results of three trials and divide by three. This number equals the average number of stars inside a one square inch frame. To make a guess about the total number of stars in the sky on this page, multiply your average by 36 as there are 36 square inches of space in this sky. The total number of stars in this sky is _____. Then, find out methods used by astronomers to estimate the number of stars in the sky.



Trial #1 _____ stars Total Stars _____
 Trial #2 _____ stars Average Number of Stars per square inch _____
 Trial #3 _____ stars Average Number of Stars x 36 = Total Number of Stars.
 Total Number of Stars = _____ stars.



JUST FOR FUN: SIGNS OF THE EASTERN WORLD ZODIAC

In addition to being quite skeptical at age fifteen, youngsters begin to view their world as an expanding one. They are familiar with the Zodiac of the Western World and may begin to study the Eastern World Zodiac. Below are twelve animals that make up the Eastern World Zodiac. These animals supposedly lined up to pay their last respects to Buddha as he lay on his deathbed. Under the appropriate picture, circle the year in which you were born. In the blanks below write the year, sign and personality traits for the year in which you were born. If you were born in 1970, the year of the dog, your personality trait would be that of a "loyal" person. Here are some other words to choose from: RAT - (Works Hard), OX - (Patient), TIGER - (Deep Thinker), RABBIT - (Ambitious), DRAGON - (Honest), SNAKE - (Sensitive), HORSE - (Cheerful), SHEEP - (Wise), MONKEY - (Clever), ROOSTER - (Deep Thinker), DOG - (Loyal), BOAR - (Kind). When finished, make an Eastern World Zodiac scrapbook noting the year of birth, sign and personality traits of at least twelve of your friends or family members. Be sure to include information about yourself in the scrapbook.

I was born in Western World year 19_____

According to Chinese Eastern World calendar, I was born in the year _____

My Eastern World sign is that of a(n) _____

My Eastern World personality trait(s) is(are) _____



1972, 1984
(4670)(4682)



1973, 1985
(4671)(4683)



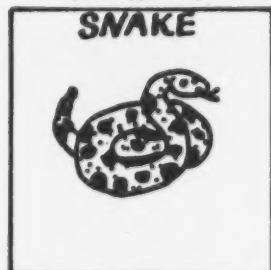
1974, 1986
(4672)(4684)



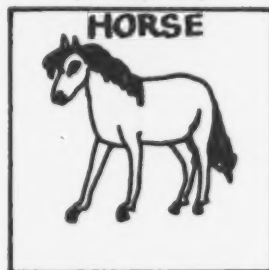
1975, 1987
(4673)(4685)



1976, 1988
(4674)(4686)



1977, 1989
(4675)(4687)



1986, 1978
(4684)(4676)



1967, 1979
(4665)(4677)



1968, 1980
(4666)(4678)



1969, 1981
(4667)(4679)



1970, 1982
(4668)(4680)



1971, 1983
(4669)(4681)

JUST FOR FUN: SIGNS OF THE WESTERN WORLD ZODIAC

At about age fifteen, youngsters look forward to thinking "far out" in space. They are often skeptical about space events. Thoughts turn to the study of astrology because it is fun to study. Also, youngsters become more aware of themselves at this age. This leads to increased inward space activities. Below is a picture of the Western World Zodiac, a circle of animals that shows the path of the moon and earth as they revolve around the sun. List and learn the name of each zodiac sign. Then, complete the Western World Zodiac activities in the boxes below. When completed, make a display from a pizza wheel that shows the zodiac sign for each of the members in your family.



Write the date of your birthday here.

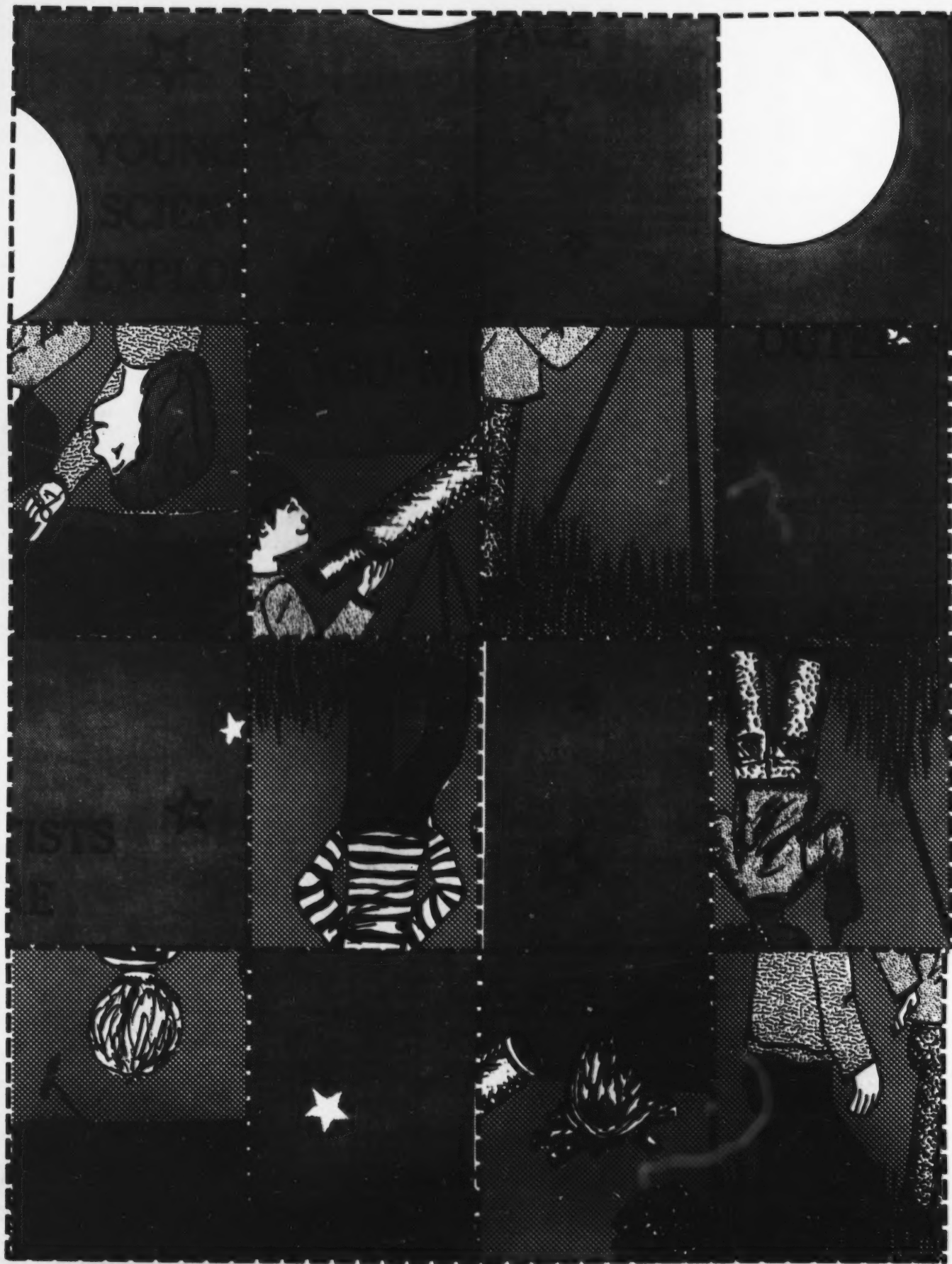
List today's date here.

Draw and label the figure that represents your zodiac sign here.

Clip your horoscope from today's newspaper and paste it here.

Draw the symbol for your zodiac sign here.

In this box, write your reaction to the statement that your horoscope can foretell your future.



TEACHER/PARENT GUIDE

MY DICTIONARY OF INNER AND OUTER SPACE TERMS

Activity Page Number II

Concept: Inner and outer space terminology

Materials: Pens, pencils, dictionaries, thesaurus, reference materials such as *A Space Age Dictionary* by Charles McLaughlin, one activity sheet per student

Description: This activity encourages youngsters to read, unscramble, alphabetize and define words that are related to inner and outer space. Introduce activity by using a dictionary to define the word "space." Give each youngster an activity sheet. Read definitions for "inner space" and "outer space." Using pronunciation keys in the dictionary, note part of speech and pronunciation key for each word. Have youngsters unscramble words by placing correct numbers in blanks. On a separate sheet of paper, have youngsters alphabetize, define and use each word in a space-related sentence. Youngsters can master one inner and outer space term per day and develop their own dictionaries of space terms. Using large sheets of chart paper, one sheet per letter of the alphabet, a class dictionary of space terms can also be developed.

Answers: Unscrambled Inner Space Terms: 7, 11, 14, 8, 16, 15, 9, 17, 2, 13, 10, 18, 4, 12, 1, 5, 3, 6.

Unscrambled Outer Space Terms: 18, 7, 11, 12, 15, 17, 1, 5, 10, 14, 16, 13, 3, 2, 4, 9, 8, 6.

YOUNG SCIENTISTS EXPLORE INNER SPACE (front cover)

Activity Page Number 1

Concept: Understanding inner self and self-concept

Materials: Scissors, glue, stiff cardboard (8½" x 11" cardboard from back of writing tablets) or tagboard, laminating machine if available, reference materials such as *Meditating with Children* by Deborah Rozman, *The Cat Who Went to Heaven* by Elizabeth Coatsworth, *The Way to Start a Day* by Byrd Baylor

Description: Have youngsters cut activity sheet into designated 16 squares. Rearrange puzzle pieces to make complete picture. Glue pieces in place onto cardboard or tagboard. Add names of student and school. Color. Decorate. Use as front cover for Student's Book. Read books listed above. Discuss one's inner feelings that promote a positive self-concept. Some youngsters may already be aware of techniques used to develop positive inner feelings. Examine geographical areas in the Eastern World and relate some beliefs held by people in these countries. Duplicate back cover of Student Book (activity page 24). Follow same procedure. Laminate both covers. Tape front cover to back cover and use as a folder for pages that make a complete Student Book. Youngsters can also use a 3-ring binder for this purpose.

Answers: Completed project looks like this:



THE INNER SPACE BEFORE THE MIRACLE OF BIRTH

Activity Page Number 2

Concept: Embryonic development

Materials: Scissors, glue, cardboard or tagboard, laminating machine if available, reference materials such as *Where Did I Come From* by Peter Mayle, pens, pencils, one activity sheet per student

Description: This activity introduces youngsters to life before birth. Have youngsters cut out the ten cards and glue to cardboard. Youngsters can write the time at which each event occurred on each card. On the reverse side, youngsters can number each card consecutively. Laminate. Play sequence game. Encourage each youngster to interview parents to learn events that occurred on the day the youngster was born. Youngsters can then write a news feature article for the local newspaper about such events. Consider possible publication of these stories. Extend activity further by listening to baby's heartbeat usually heard at 26 weeks of age. Envelopes can be used to store cards.

Answers: Background Information for Teachers.

- X Day 1 - Sperm ovum released into mother's oviduct.
- O Day 7 - Fertilized ovum has formed a blastocyst embedded in uterus.
- Day 13 - Blastocyst has produced a yolk sac and embryonic disk.
- △ Day 23 - Embryo has makings of heart, brain and spinal cord.
- ☐ Day 29 - Embryo has a head and buds that will eventually be arms and legs.
- * Week 6 - Embryo's eyes, ears and vital organs are developing. Length of embryo is 0.5 inches (1.3 cm).
- Week 9 - Embryo is now 2 inches (5 cm) long and weighs .35 oz. (10 g).
- Week 14 - Change from embryo to fetus which is 7 inches (18 cm) long and weighs 4 oz. (113 g).
- Week 26 - Fetus now 15 inches (38 cm) and weighs 2 lbs. (970 g) and can survive if born.
- ☒ Week 38 - Baby is born. Average baby is 20 inches (51 cm) and weighs 7 lbs. (3.18 kg).

BIRTH: A FIRST GLIMPSE AT SPACE

Activity Page Numbers 3, 4

Concept: Observation of objects in space, balance, eye-hand coordination

Materials: Scissors, glue, tagboard or cardboard, pens, pencils, punch, thread or string, laminating machine if available, reference materials such as *Read About the Ear* by Kathleen Elgin, one copy of pages three and four per student.

Description: This activity encourages youngsters to reflect on early life experiences. Discuss how parents attach mobiles to baby beds and how eye-hand coordination is developed in babies. Extend discussion to include how people perform high wire acts in a circus. Discuss the role of the inner ear in balance in these acts. Give one copy of pages three and four to each youngster. Cut out shapes, glue to tagboard or cardboard, laminate, punch holes, thread with string and attach to tagboard as shown. A dowel, pipe cleaner, part of a tree branch or small coat hanger can be used to hang mobile from ceiling or desk. Identify objects in environment that have these shapes on mobile. Extend activity by having youngsters walk on a balance beam or stand on one foot. Also, discuss what a person's "inner balance" might include.

Answers: Completed project as shown on page 4.

A CRAWL THROUGH SPACE

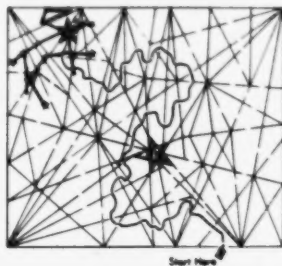
Activity Page Number 5

Concept: Identification of stars, Sirius (brightest star excluding sun), Canis Major (Dog), location of perfect star, geometric shapes

Materials: Pencils, reference materials such as *The Stars* by H.A. Rey or *Star Travel* by Kenneth Gatland, one activity sheet per student

Description: This maze puzzle encourages youngsters to locate the brightest star SIRIUS (exclusive of sun) and identify 15 other stars in the constellation CANIS MAJOR. Locate star Sirius, the Dog Star. Discuss how Sirius is named the Dog Star because of its location in the group of stars called CANIS MAJOR, Latin name for Great Dog. Give each youngster one activity sheet. With pencil, youngsters can trace path to Sirius. Have youngsters then find the perfect star by shading in correct triangles. Conclude activity by having youngsters connect the stars in Canis Major making the shape of a dog.

Answers: Completed activity sheet looks like this:



A WALK THROUGH SPACE

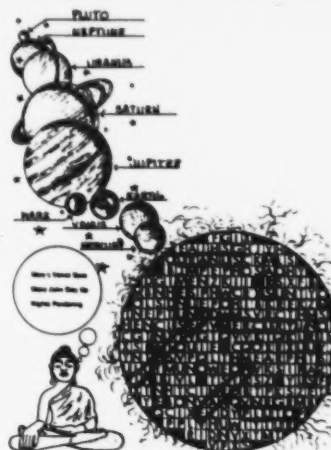
Activity Page Number 6

Concept: Identification of planets

Materials: Pens or pencils, reference materials such as *The Nine Planets* by Franklyn Branley, *2010: Odyssey Two* by Arthur Clarke

Description: This activity introduces youngsters to the order of the nine planets in the solar system. Read excerpts from *Odyssey* each day to class. Give youngsters activity sheet and have them identify planets in order from the sun. NOTE: Pluto is normally the farthest planet from the sun as shown. Currently, however, the orbit of Pluto lies within the orbit of Neptune, thus Neptune is the farthest away planet. This will be true until the year 1999 when Pluto will resume its normal position. Discuss characteristics of planets such as the Red Spot of Jupiter and its moons. Youngsters circle names of planets in the puzzle. Introduce saying. Encourage youngsters to develop a news broadcast that would announce the discovery of a tenth planet and what this planet may contain on its surface.

Answers: Completed activity sheet looks like this:



SPACE TALK CODES

Activity Page Number 7

Concept: Sending coded messages through space, Morse Code, satellite communication

Materials: Pens, pencils, reference materials such as an encyclopedia for information on the Morse Code, *A Book of Satellites for You* by Franklyn Branley, one activity sheet per student

Description: Introduce activity with a discussion on how satellites are used to convey messages such as televised sporting events around the world. Discuss Samuel Morse and Morse Code. Tap out several codes. Give each youngster activity sheet. Discuss how messages are transmitted from outer space to Earth especially those sent from the moon. Youngsters then decode the space message sent by Neil Armstrong as he stepped

on the moon. Extend study with a discussion on how lasers and fiber optics are used in communication systems today.

Answers: That's one small step for man, one giant leap for mankind. Neil Armstrong, July 20, 1969.

A RIDE IN SPACE

Activity Page Number 8

Concept: Determining distance between points in world space via mileage chart

Materials: Pens or pencils, state road map, scissors, colored pens or crayons, large world map, yarn or string, reference materials such as *Junior Jet Guide: Captain's Log* by Margaret Crush, one activity sheet per student

Description: In this activity, youngsters determine the distance traveled in space between two points. Discuss city, state, country and world space. Using mileage chart found on state road map, find distance between your city and another city in your state. Next, further increase youngster's understanding of space with the world map and mileage chart on activity sheet. String yarn or string between cities to show route. Youngsters find distance in miles (kilometers) between two world cities by using the grid matrix. Youngsters calculate the total number of miles (kilometers) to join Space Club. Cut out and color ribbons for all to share. Contact automobile and travel agencies for maps to be used in this exercise.

Answers: Completed mileage chart looks like this:

YOUNGSTERS EXPLORE SECRET SPACES

Activity Page Number 9

Concept: Future space station, location of significant astronauts and space objects via grid, astronauts duties/roles

Materials: Pens or pencils, rulers, reference materials such as *Space Stations* by Eric Bergaust or *The Astronauts* by Dinah Moch, one activity sheet per student

Description: This activity introduces youngsters to part of what a space station may look like in future space missions. Introduce activity by discussing Space Shuttle missions and student projects featured on these flights. Studying the behavior of animals and plants are examples of such projects. Give youngsters space shuttle grid activity sheet. Youngsters identify appropriate grid space for each numbered astronaut. Tasks performed by each astronaut and possible future projects can then be discussed. Youngsters then design one project that they would like to see conducted on future space flights. Submit projects for national competition. Contact the National Science Teachers Association, 1742 Connecticut Avenue, N.W., Washington, D.C. 20009 for details.

Answers:

Astronaut No.	Grid Space	Duty/Role
1	A2	Computer Programmer
2	A3, A4	Explorer
3	A5, B5	Control Panel Expert
4	B2	Observer
5	B2	Maintenance
6	B4, C4	Data Manager
7	C6, B6	Commander
8	D1	Health Technician
9	D3	Lookout
10	D4	Copilot
11	D5, D6	Physicist

Total grid area - 42 square inches (262.5 cm²).

Total area of space station = approximately 29 square inches (181. cm²).

FROM	TO	Miles	Kilometers
New York, USA	Los Angeles, USA	2451	(3944)
New York, USA	Berlin, Germany	3961	(6374)
Los Angeles, USA	Quebec, Canada	2579	(4150)
New York, USA	London, England	3459	(5567)
Los Angeles, USA	Peking, China	8250	(10058)
New York, USA	Tokyo, Japan	6735	(10839)
Los Angeles, USA	Moscow, USSR	6068	(9765)
Total Miles		31,503	(50,405)

DRESS THE ASTRONAUT

Activity Page Number 10

Concept: Identification of space gear, career awareness

Materials: Pens, pencils, scissors, glue, reference materials such as *A Young Scientist Book of Spaceflight* by Kenneth Gatland, small photo of each youngster, one activity sheet per student

Description: This activity introduces youngsters to various pieces of space gear worn and used by astronauts. Have youngsters cut out and paste each piece of gear to astronaut at correct locations. Discuss function of each piece of gear and various careers in space-related activity. After youngsters have glued a picture of themselves on the face of the astronaut, have youngsters cut out and name the astronaut. On the astronaut's back, youngsters are encouraged to write an advertisement that lists the qualifications needed to become an astronaut. Hang from desk or ceiling as a mobile. Then, youngsters can answer advertisements by telling their friends why they may become an astronaut some day. Youngsters may want to also study the activities of Ham, a chimpanzee, who made a suborbital flight in January, 1961. Ham, died at age 26 in February, 1963. At his side was his female friend, Maggie.

Answers: Completed project looks like this:



SPACE STICKERS

Activity Page Number 11

Concept: Space sayings

Materials: Pens, pencils, colored markers, crayons, pins, tape, scissors, laminating machine if available, one activity sheet per student

Description: This activity allows youngsters to create catchy, eye-appealing bumper stickers, space sayings or logos that explain science concepts. Introduce activity with a space-related bumper sticker or NASA logo. Discuss each including black hole in Cygnus X-1. Give youngsters activity sheets on which they design stickers and logos. Cut out when completed. Laminate. Post for all to see. Encourage youngsters to develop collections of space stickers and logos to place in an album. Actual space bumper stickers can be purchased from the Astronomical Society of the Pacific, 1290 24th Avenue, San Francisco, CA 94122, NASA logos from NASA Johnson Space Center, Houston, TX 77058.

Answers: Answers will vary with design of stickers and logos.

SPACE TO KIDS IS . . .

Activity Page Number 12

Concept: Definition of space, decision-making skills, value clarification

Materials: Pens or pencils, dictionaries, reference materials such as *Space Among Us* by Charles Boyle, newspapers and magazines, one activity sheet per student

Description: This activity helps youngsters clarify their own conception of space and space-related activity. Discuss various meanings of the word space including space found outside and within the youngsters themselves. Youngsters circle the word agree or disagree in each statement, then write a story on what space means to them in the space bubble. Encourage youngsters to develop an individual or class space scrapbook for all to share. Hold a debate on whether the U.S. should explore outer space. Generate and accept as many different viewpoints as possible in your discussion.

Answers: Answers will vary dependent on student responses.

A SPIN THROUGH SPACE

Activity Page Number 13

Concept: Nine planets with corresponding signs and features

Materials: Pens, pencils, scissors, glue, punch, paper fastener, laminating machine if available, reference materials such as the *How and Why Wonder Book of Planets and Interplanetary Travel* by Harold Highland, or *The Scholastic Funfact Book of Stars and Planets*, one activity sheet per student

Description: This activity introduces youngsters to the planets, the sign for each, and distinguishing features. Using activity sheet youngsters follow directions to

make a spinner wheel of planets. Glue to cardboard. Laminate each wheel and pointer. Insert cardboard washer between discs. Fasten at center. Spin pointer. Name of planet on circle B is rotated to match sign on circle A. Youngsters should be encouraged to make a list of features found on each planet. The features below may be used as a starter activity. Then, have youngsters look up information on *Voyager I* and *Voyager II* missions to outer planets including *Voyager II*'s mission to Jupiter in July 1979, Saturn in August 1981 with scheduled visits to Uranus in January 1986 and Neptune in September 1989.

Answers: Answers will vary. Features include:

Planet	Sign	Feature
Mercury	☿	Closest planet, Iron core
Venus	♀	Sulphuric acid (H ₂ SO ₄) clouds, carbon dioxide (CO ₂) atmosphere
Earth	⊕	Blue water, white clouds, home sweet home
Mars	♂	Deimos, Phobos moons of this red planet
Jupiter	♃	Great red spot, moons: Callisto, Ganymede, Europa & Io
Saturn	♄	Over 1,000 rings
Uranus	♅	5 moons, 9 faint rings
Neptune	♆	Icy & cold, moons: Triton & Nereid
Pluto	♇	8th planet until year 1999, then last again

A YOUNG SCIENTIST EXPERIMENTS IN SPACE

Activity Page Number 14

Concept: Principles of flight

Materials: Scissors, paper clips, yardsticks (metersticks), reference materials such as *Helicopters and How They Work* by John Lewellen, tape recorder, stopwatch or clock, one activity sheet per student

Description: This activity introduces youngsters to basic aerodynamic principles. Give one activity sheet to each youngster. Cut out and fold helicopter as directed. Do test flight with youngsters noting the direction of spin of the blades. Record trial number, height from which craft is dropped, time of descent and direction of spin on a chart as shown at bottom of page. Encourage youngsters to design their own crafts using short, fat wings or long thin wings. Using reference materials youngsters can report on the accomplishments of Igor I. Sikorsky, who made the first practical single rotor helicopter in 1939.

Answers: Answers will vary dependent upon type of craft designed.

THE MIRACLE OF SPACE FLIGHT

Activity Page Number 15

Concept: Principles of flight, Bernoulli's Principle, moving air creates lift

Materials: Scissors, tape, reference materials such as *Illustrated Flying Basics* by Thom Hook, *The Paper Airplane Book* by Seymour Simon, and *Flying Origami* by Eiji Nakamura, one activity sheet per student

Description: This activity introduces youngsters to the basic principles of flight including thrust, lift, drag and weight. Introduce activity with a discussion on how a bird flies (on upstroke of wing, feathers pivot and *open* causing air to rush through wing producing weight. On downstroke of wing, feathers pivot and *close* yielding little air rushing through wing thus producing lift). Provide youngsters with sheets of paper as needed. Youngsters follow nine steps to make aircraft. Name craft. Do trial runs. After making a flight logbook, youngsters can produce a documentary of happenings on their space flights. Extend study to include identification and function of parts of an airplane including rudder, elevators, vertical and horizontal stabilizers and ailerons.

Answers: Will vary with student creations.

FINDING YOURSELF IN SPACE

Activity Page Number 16

Concept: Directions from perspective of observer, relativity.

Materials: Pens or pencils, reference materials such as *Relative Position and Motion* by the Science Curriculum Improvement Study (Rand McNally), one activity sheet per student

Description: This activity orients youngsters as an observer in space relative to other objects in space. Introduce activity by reviewing basic direction terms. After youngsters have acted out each situation, they circle the correct answer to each question. Extend activity to include direction questions from a reference point on earth relative to the location of the sun, moon and stars as viewed from earth.

Answers: (1) left, (2) below, (3) back, (4) west, (5) north, (6) not moving, (7) moving, (8) moving.

MOON GRID

Activity Page Number 17

Concept: Locations of significant moon landings

Materials: Pens or pencils, reference materials such as *Project Apollo* by Charles Coombs, *The Next 50 Years on the Moon* by Erik Bergaust, *Moon, Moon* by Anne Kent Rush, popular songs such as "By the Light of the Silvery Moon," "Moon River," "Dark Side of the Moon" (Pink Floyd) or "Girl on the Moon" (Foreigner 4), one activity sheet per student

Description: This activity helps youngsters locate specific moon landing sites by using a grid. Play records of popular songs noted above. Discuss Apollo (American) and Luna (Russian) missions to the moon. Note difference between a mare (sea) and crater (hollow round opening or depression). Youngsters plot locations of six Apollo and three Luna moon missions and probes on moon map and list grid space for each. Discuss Apollo 11 mission during which Neil Armstrong became the first human to step on the moon. The date was July 20, 1969, the location, Sea of Tranquility, a mare.

Answers:

Event	Grid Space	Location	Date
Apollo 11	D5	Sea of Tranquility	7/20/69
Apollo 12	D2	Ocean of Storms	11/19/69
Apollo 14	D3	Fra Mauro Crater	2/5/71
Apollo 15	C4	Hadley-Apennines Mountains	7/29/71
Apollo 16	E5	Region of Descartes	4/21/72
Apollo 17	C6	Region of Taurus-Littrow	12/11/72
Luna 16	D7	Sea of Fertility	9/20/70
Luna 17	B3	Sea of Rains	11/17/71
Luna 20	D7	Sea of Fertility	2/21/72

VERTIGO: BEING DISORGANIZED IN SPACE

Activity Page Number 18

Concept: Space-related objects and medical effects of flight

Materials: Pencils, reference materials such as *Man's Reach for the Stars* by Roy Gallant, one activity sheet per student

Description: This puzzle features pieces of space clothes and equipment that are hidden. Discuss the importance of keeping such paraphernalia orderly. Youngsters circle each item on activity sheet. Introduce word "vertigo" by gently turning youngster around on a swivel stool. Explain that vertigo is a feeling as if your head were turning round and round or other things were circling around you. This causes a loss of balance and makes it hard to keep from falling. Discuss how vertigo is one symptom of "motion sickness." Note the effects of vertigo in space flight whereby astronauts rely on flight instruments rather than their own senses to guide their crafts. Encourage youngsters to find out more about vertigo from a pilot at a nearby air facility and write a prescription for vertigo and motion sickness in their science notebooks.

Answers: Completed activity sheet looks like this:



SPACED OUT

Activity Page Number 19

Concept: After images, color awareness in space

Materials: Colored pens and pencils, screen or white wall, paints, reference materials such as *The Kirillian Aura* by Stanley Krippner and Daniel Rubin, *Robert H. Goddard* by Milton Lomask, one activity sheet per student

Description: Introduce this activity by reading part of the story of Robert Goddard, Father of Rocketry, and how he had a small idea for a rocket and how this idea led to the exploration of outer space. Discuss historic events, based on the work of Goddard such as the

astronauts landing on and leaving the U.S. flag on the moon. Give one activity sheet to each youngster. Discuss exploration of moon, planets in our solar system and what may lie beyond our solar system in the universe. Youngsters color in appropriate areas on flag. Stare at white wall or screen. Draw pictures of what is seen. Encourage youngsters to color in other objects and areas in the scene. Repeat procedure. Discuss function of rods (black and white vision) and cones (color vision) in eyes. Study optical illusions and auras.

Answers: Youngsters should see colors of U.S. flag on white wall or screen.

A VIEW OF INNER SPACE

Activity Page Number 20

Concept: Self-awareness, self-concept

Materials: Pens or pencils, friends, writing paper, reference materials such as *The Centering Book: Awareness Activities for Children, Parents, and Teachers* by Gay Hendricks and Russell Wells, *The Compassionate Teacher* by John Miller, *The Hollering Sun* by Nancy Wood, one activity sheet per student

Description: Introduce activity by reading selections from *The Hollering Sun* by Nancy Wood. Discuss inner and outer types of space with youngsters. Pair youngsters. Have first member of pair read story to other member of pair. Reverse roles. Youngsters then complete a daily diary by writing about this experience. Encourage other teachers and parents to do the same. Have youngsters dramatize how they felt when the story was read. Continue similar exercises as suggested in reference books above for a short period of time each day.

Answers: Answers will vary with students' stories.

SAMPLING STAR SPACE

Activity Page Number 21

Concept: Sampling method

Materials: Scissors, laminating machine if available, reference book such as *The Stars* by H.A. Rey, one activity sheet per student

Description: This activity introduces youngsters to a method of sampling stars on paper that represents the sky. Discuss the meaning of the word SAMPLE and how biologists use the sampling method to count the number of organisms in a sample of water or number of animals living on a plot of land. Have youngsters cut out frame with 1 square inch opening. Laminate. Youngsters place see-through frame on sky and count stars found inside frame. Do two more trials. Average the three trials and multiply by 36 to find total number of stars in the sky. Encourage youngsters to do other sampling exercises and actually find out how astronomers determine the number of stars in the sky.

Answers: There are 381 stars in the sky on this activity sheet.

JUST FOR FUN: SIGNS OF THE EASTERN WORLD ZODIAC

Activity Page Number 22

Concept: Eastern World Zodiac

Materials: Pens, pencils, reference materials such as an astrological almanac, world map, fortune cookies, one activity sheet per student

Description: This activity introduces youngsters to the Chinese Eastern World Zodiac. Have youngsters locate Eastern World countries such as China on a world map. Give each youngster a fortune cookie. Discuss horoscope sayings often found in fortune cookies. Discuss Chinese calendar. Note differences in years from Western World calendar. Give one activity sheet to each youngster. Have youngsters circle the year in which they were born. Identify animal and personality trait(s). Youngsters can then survey friends and family members and develop a class scrapbook of Eastern World Zodiac signs of their classmates and family members. Note: Chinese year found in ().

Answers: Answers will vary dependent upon birth dates of youngsters. The following years represent the Chinese Year equivalent:

Western World Year	Chinese Year
1983	4881
1982	4880
1981	4879
1980	4878

NOTE: An inexpensive Chinese Lunar Horoscope poster can be obtained from the Chinese American Civic Council, 2249 S. Wentworth, Second Floor, Chicago, IL 60616

JUST FOR FUN: SIGNS OF THE WESTERN WORLD ZODIAC

Activity Page Number 23

Concept: Western World Zodiac

Materials: Pens, pencils, reference book such as *Gospel of the Stars: A Celebration of the Mystery of the Zodiac* by Peter Lemesurier, newspapers, one activity sheet per student

Description: Introduce activity by reading horoscope for youngster who celebrates his/her birthday on this day. Discuss astrology and how some people believe they can foretell their future by consulting a horoscope. List and name each figure and sign in the zodiac. Youngsters complete information in boxes located below zodiac. Youngsters can then be encouraged to gather zodiac information on family members and classmates. Note: This activity is viewed as a fun activity in that there is no scientific evidence to support such beliefs.

Answers: Answers will vary dependent upon birth dates of youngsters and their family members.

YOUNG SCIENTISTS EXPLORE OUTER SPACE

(back cover)

Activity Page Number 24

Concept: Understanding vastness of space and what may lie beyond our Solar System

Materials: Scissors, glue, stiff cardboard (8½" x 11" cardboard from back of writing tablets) or tagboard, laminating machine if available, reference materials such as *National Geographic* "The Incredible Universe" May 1974, *2010: A Space Odyssey* by Arthur Clarke, *Voyager: The Story of a Space Mission* by Margaret Poynter, one activity sheet per student

Description: Have youngsters cut activity sheet into designated 16 squares. Rearrange puzzle pieces to make complete picture. Glue pieces in place onto cardboard or tagboard. Color. Decorate. Name objects in space. Discuss vastness of outer space and *Voyager* missions. Examine geographical areas on Earth in Western World and beliefs held by such people. Compare to Eastern World countries. Laminate. Tape back cover to front cover and use as a folder for pages that make complete Student Book. Youngsters can also use a 3-ring binder for this purpose.

Answers: Completed project looks like this:



FOR A FREE CATALOG WRITE: Good Apple, Inc., Box 299, Carthage, IL 62321